SESSIONAL PAPERS

VOLUME 6

FIRST SESSION OF THE NINTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1901

VOLUME XXXV

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OF THE

SESSIONAL PAPERS

OF THE

PARLIAMENT OF CANADA

FIRST SESSION, NINTH PARLIAMENT, 1901.

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5. Further Supplementary Estimates for the year ending 30th June, 1901. Presented 9th April, 1901, by Hon. W. S. Fielding.......................... *Printed for both distribution and sessional papers.*

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5*b*. Further Supplementary Estimates for the year ending 30th June, 1901. Presented 14th May, 1901, by Hon. W. S. Fielding.......................... *Printed for both distribution and sessional papers.*

5*c*. Further Supplementary Estimates for the year ending 30th June, 1902. Presented 18th May, 1901, by Hon. W. S. Fielding.......................... *Printed for both distribution and sessional papers.*

6. List of Shareholders of the Chartered Banks of Canada, as on the 31st December, 1900. Presented 26th March, 1901, by Hon. W. S. Fielding.......... *Printed for both distribution and sessional papers.*

7. Report of dividends remaining unpaid and unclaimed balances and unpaid drafts and bills of exchange in the Chartered Banks of Canada, for five years and upwards prior to 31st December, 1900. Presented 20th May, 1901, by Hon. W. S. Fielding... *Printed for both distribution and sessional papers.*

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8. Report of the Superintendent of Insurance, for the year ended 31st December, 1900. *Printed for both distribution and sessional papers.*

9. Abstract of Statements of Insurance Companies in Canada, for the year ended 31st December, 1900. Presented 2nd April, 1901, by Hon. W. S. Fielding. *Printed for both distribution and sessional papers.*

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individual who may have become vested with the said bonuses or subsidies by transfer or otherwise, during each of the said years, and the conditions of such payments. 4. On what part or parts of the said bonuses or subsidies voted during the said years was interest payable, and how much of each of the said bonuses or subsidies on which interest is payable has been paid, giving details with reference to each railway. 5. The amount of interest paid during each of the said years by each of the said railways on the bonuses or subsidies they have received. 6. What railways to which bonuses or subsidies have been voted by parliament during each of the said years, and paid wholly or in part with the condition that interest should be payable, have paid interest on the bonuses or subsidies received by them, and how much interest has each railway receiving such bonuses or subsidies paid each year. Presented 25th February, 1901.—*Mr. Wilson.*
Not printed.

56. Return to an address of the House of Commons, dated 12th February, 1901, for copies of the address presented by the citizens of Dawson to his excellency the governor general on the occasion of his excellency's visit to that city in 1900, all orders in council, correspondence and papers in any way connected with the said address and the requests and representations contained therein. Presented 26th February, 1901.—*Sir Charles Hibbert Tupper*..... .... *Not printed.*

57. Return to an order of the House of Commons, dated 12th February, 1901, for copies of all papers, instructions, tenders, contracts, specifications, correspondence, reports in any way relating to the construction of a dwelling for the officers of the government or staff in Dawson city. Also all instructions, papers, tenders, contracts, correspondence, reports in any way relating to the construction of public buildings under contract awarded to William Rourke. Also all instructions, papers, tenders, contracts, specifications, reports in any way relating to the construction of a bridge leading from the barracks and other public buildings to the main part of the town in Dawson. Presented 26th February, 1901.—*Sir Charles Hibbert Tupper*.. .. ..*Not printed.*

58. Ordinances of the Yukon Territory for 1900, pursuant to 61 Victoria, chapter 6, section 7. Presented 28th February, 1901, by Hon. C. Sifton .. .. *Not printed.*

58a. Return to an order of the House of Commons, dated 12th February, 1901, showing an itemized statement of the number of gallons of spirituous and malt liquors taken into the Yukon District since the period covered by return (1900) the number of permits issued therefor, name and post office address of those persons or companies to whom permits were granted, and the amount paid therefor, and all correspondence in connection therewith. Presented 28th February, 1901.—*Sir Charles Hibbert Tupper*............ ....*Not printed.*

58b. Return to an order of the House of Commons, dated 12th February, 1901, for copies of all reports from Mr. Ogilvie, commissioner of the Yukon district, not already brought down, together with such information as is available respecting the report referred to on page 5025 *Hansard*, May 10, 1900, and the delay in sending it forward. Presented 4th March, 1901.—*Sir Charles Hibbert Tupper*........ .... *Not printed.*

58c. Return to an order of the House of Commons, dated 18th February, 1901, of all reports made by Mr. Charleson respecting telegraph construction work formerly or now under his charge; showing also the names of men employed under him between Bennett and Dawson and the nationality of each so far as possible; the wages and allowances for each man so employed; particulars as to any strikes on the part of the men for higher wages; the names of parties who supplied the poles for the telegraph wire, and copies of all contracts and correspondence respecting the same; whether standing trees en route have been used for stringing wires, and if so, for what distance approximately, in comparison with the distance where poles were used; how many poles were paid for, how many of those paid for were not used for the telegraph line; whether the linemen employed at Dawson, Ogilvie, Selwyn, Selkirk, Five Fingers, Lower LeBarge and Tagish are British subjects, and if not, the nationality of each; the names of sub-contractors for the supply of poles and the residence of each sub-contractor, and all contracts respecting the same; the terms of charter of ss. *W. S. Stratton*, the charterer's name and all papers respecting the same; the name of her master and acting master and his nationality; the terms of the charter party; the use made of this steamer, whether she was used for supplies or otherwise, and what boats other than scows were so used; how many scows were used and on what terms; the amount charged or paid for transportation by water outside of the ss. *Stratton*; the length of time during construction Mr. Charleson was actually present with the construction party; the particulars as to purchase of ss. *Lullie C.*, the purchase, disposal or sale or transfer of the boat and the terms thereof respectively; copies

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of all reports and correspondence respecting the same ; the arrangement for supplies made and with whom ; the arrangement at Bennett respecting pay for men's time returning from Dawson ; the amount already paid for the line under Mr. Charleson's charge ; copies of accounts rendered and of accounts paid in connection with this telegraph work, the rate of pay first and now allowed A. Boyer, assistant to Mr. Charleson ; also a statement showing where Mr. Charleson places his orders in Vancouver in this connection and on what terms, and what commissions, if any, are paid on these supplies and to whom ; the name of Mr. Charleson's agent at Vancouver in this connection ; the quantity of supplies obtained by Mr. Charleson from the United States ; whether Mr. Charleson's son was paid $350, or other amount or amounts for expenses of a trip to Ottawa or otherwise, and whether he is or was then an employee of the government ; whether Mr. Charleson awards contracts to his foreman, and whether the foreman's expenses were paid into the locality of operations at government expense, and whether tenders are asked for in this connection ; and all contracts, reports, and papers respecting contracts let by Mr. Charleson or under his supervision in connection with the telegraph line from Bennett to Dawson. Presented 5th March, 1901.—*Sir Charles Hibbert Tupper*...........*Not printed.*

58*d*. Supplementary return to 58*a*. Presented 5th March, 1901..........*Not printed.*

58*e*. Regulations governing the issue of permits to take liquor into the Yukon territory. Presented 8th March, 1901, by Hon. C. Sifton..........*Not printed.*

58*f*. Return to an order of the House of Commons, dated 13th March, 1901, for a copy of the correspondence relative to the Huston liquor permit. Presented 13th March, 1901, by Hon. C. Sifton. *Not printed.*

58*g*. Return to an order of the House of Commons, dated 18th February, 1901, in tabular form, showing the names of all cases in which an appeal has been taken to the hon. the minister of the interior (past and present) under the mining regulations, the date when each appeal was perfected, heard and decided. Presented 18th March, 1901.—*Sir Charles Hibbert Tupper*............ *Not printed.*

58*h*. Return to an order of the House of Commons, dated 18th March, 1901, for copies of all correspondence and papers relating to the issue of an order for the suppression of theatres and gambling houses in Dawson city. Presented 18th March, 1901.—*Hon. C. Sifton*..........*Not printed.*

58*i*. Return to an order of the House of Commons, dated the 21st February, 1901, for copies of all despatches, letters, telegrams, correspondence, reports respecting the subjects included in the following telegram of August 2nd, 1900 : "Ottawa, Ont., Aug. 2, via Bennett, Aug. 7. F. C. Wade, Dawson,—Sir Wilfrid has handed me your message. Am endeavouring to remove difficulties caused by delays in answering communications addressed to other departments. Superintendent Taché, of the public works department, is now en route to Dawson, with orders for the construction of trails and public buildings. Government considering plan of readjustment of royalty which will lighten tax and, we think, prove generally satisfactory. Order granting representation in local council takes effect immediately. Ryley, of mining branch, en route to Dawson. Will report amendments to mining laws. Careful consideration, letters and petitions received here, convinces me every reasonable request regarding mining laws can be met in near future. Impossible for me to visit Yukon now. Hope to get there before many months. CLIFFORD SIFTON." Presented 25th March, 1901.—*Sir Charles Hibbert Tupper*..........*Not printed.*

58*j*. Return to an order of the House of Commons, dated 7th February, 1900, for copies of all applications, records, reports, letters and memoranda relating to claims No. 18 and 26 and 16B referred to on pp. 197, 204, including the letter from Alexander McDonald to Major Walsh, pp. 197, 198 (pages refer to Blue-book Yukon evidence presented to parliament during session of 1899). Also the records of papers showing the dates when royalties became due, and when royalties were collected in the Yukon district in 1897 and 1898, in the case of Alexander McDonald's claims and mining interests. (*b*) Alexander McDonald's letter of 20th July, referred to at p. 211 (Yukon Blue-book of evidence, 1899). (*c*) Return of Report of Major Walsh *re* royalties (referred to on page 211, Yukon Blue-book evidence, 1899). (*d*) Reports and papers relating to the case of Jenkin Llewellyn, referred to on pp. 211, 212, 213 (Yukon Blue-book above). (*e*) Reports and papers relating to cases dealt with under Judge Maguire's ruling, referred to on p. 246 (Yukon Blue-book above). (*f*) Reports and papers relating to Phil. Miller's case, p. 247 (Blue-book above). (*g*) Reports and papers relating to Murphy's case, 247 (Blue-book above). Presented 22nd April, 1901.—*Sir Charles Hibbert Tupper*..........*Not printed.*

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copies of all communications and papers which led the inspector to make inquiry with regard to any of these matters. Presented 3rd April, 1901.—*Mr. Barker*.......... ....*Not printed.*

84. Return to an order of the House of Commons, dated 21st February, 1901, showing the names and addresses of all parties tendering (where tenders were called for) for coal and wood, or either, for the uses of the government of Canada since 1st July, 1899; copy of the tender put in by each party tendering, copy of the specification issued in each case where tenders weré called for, name and address of the successful tenderer in each case, together with the kind, quality and quantity of coal and wood, or either, tendered for; also the kind, quality and quantity of coal and wood, or either, for which tenders were accepted in each case, and the prices paid; also the location of each government building or institution supplied with coal and wood, or either, the quantity and quality and sizes of coal and wood, or either, supplied to each and the price in each case. Also the names and addresses of all parties supplying coal and wood, or either, without tender since the above date to the government of Canada, the kind, quality and quantity supplied in each case by each person, the prices paid in each case, and the location of the building or institution supplied. Presented 3rd April, 1901.—*Mr. Clarke*.................................. ....*Not printed.*

85. Return to an order of the House of Commons, dated 12th February, 1901, showing: 1. The number of immigration agents employed by the government of Canada in the United States of America for each of the calendar years 1894-5-6-7-8-9 and 1900, together with the names of each of such agents, date of appointment of each, the location of each during each of said years, the salary of each during each of said years, number of days spent by each in his office, each year, amount of rent paid by each agent for offices during each of said years, number of days spent by each agent in travelling and amount of travelling expenses of each during each of said years, and amount allowed during each of said years to each or any of the said agents for board or lodging, or for both, the amount of help employed by each agent during each of said years, together with the amounts paid by each agent each year for such help, giving the names of persons employed, number of days employed each year and amounts paid each year to each person employed, and showing all other expenses in connection with these agents and their work. Date of leaving or dismissal from the service of the Dominion government. If still in the employment of the government, where, and the salary for the present year, and the number of emigrants reported by each agent during each of the said years as having emigrated to Canada from the district in which he was working. 2. The number of agents employed by the government of Canada in the United States of America for each of the calendar years 1894-5-6-7-8-9 and 1900, who were paid by commission, the manner of determining the commission to be paid each agent, the amount paid to each during each of said years, the amount of all other expenditure incurred by the government of Canada during each of said years on account of immigration agents employed in the United States of America on commission, and the work done by each of such agents during each of said years. 3. The names of all other immigration agents employed during the calendar years 1894-5-6-7-8-9 and 1900 by the government of Canada, the date of appointment of each, the location of each during each of said years, the salary of each during each of said years, the number of days spent by each in travelling and the travelling expenses of each during each of the said years, the number of days spent by each in his office during each of said years and amounts paid by each for office rent and hired help, in detail, during each of said years, amount allowed to each for board and lodging during each of said years, and amount of all other expenses during each of said years of each such agents in connection with his office and charged to the government of Canada. 4. Date of appointment of W. T. R. Preston, his salary, his duties, his travelling expenses, amount he charged the government of Canada for board and lodging and other expenses in connection with his office, during each year since his appointment. Presented 9th April, 1901.—*Mr. Wilson.* *Not printed.*

86. Return to an order of the House of Commons, dated 13th February, 1901, for copies of the evidence, exhibits and report of the inquiry held at Inverness, in the county of Megantic, by Hon. Mr. Justice White, of Sherbrooke, in the matter of the post office of Kinnear's Mill. Presented 9th April, 1901. —*Mr. Turcot* ....*Not printed.*

87. Return (in part) to an address of the House of Commons, dated 3rd April, 1901, for copies of all correspondence, telegrams and messages in the government labour bureau between the department and all persons referring to the labour strike at Valleyfield, in Beauharnois county, province of Quebec, during the month of November last; also copies of all letters, telegrams and messages exchanged between the militia department and the municipal authorities at Valleyfield, or any justice of the

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REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1900

PART I.—EXCISE, &c.

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
EXCELLENT MAJESTY
1900

To His Excellency the Right Honourable The Earl of Minto, Governor General of Canada, &c., &c.

MAY IT PLEASE YOUR EXCELLENCY :

I have the honour to transmit to Your Excellency the RETURNS AND STATISTICS of Inland Revenues of the Dominion of Canada, for the Fiscal Year ended June 30, 1900, as prepared and laid before me by the Commissioner of Inland Revenue.

All of which is respectfully submitted.

M. E. BERNIER,
Minister of Inland Revenue.

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How much deducted from each Officer's salary.....	140	110	129	137	137	143	147	151	137
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REPORT

OF THE

COMMISSIONER OF INLAND REVENUE

To the Honourable M. E. BERNIER,
Minister of Inland Revenue.

SIR,—Herewith I have the honour to submit statements of the Inland Revenues collected by this department during the fiscal year ended June 30, 1900, with the usual information as to the cost of collection and statistics respecting the sources whence these revenues were derived.

The following summary comparison shows the accrued revenue for the years ended June 30, 1896, 1897, 1898, 1899 and 1900 respectively.

—	1896.	1897.	1898.	1899.	1900.
	$	$	$	$	$
Excise, including Methylated Spirits...	7,956,740	9,182,042	7,916,483	9,722,967	9,931,950
Public Works....	5,639	13,632	8,915	5,090	5,366
Culling Timber.......	9,794	10,356	17,107	10,624	8,155
Weights and Measures, Gas and Law Stamps...	54,184	58,228	64,570	73,499	78,510
Electric Light....	8,688	6,844	9,425	11,520	14,452
Other Revenues.....	6,041	770	720	642	643
Totals...	8,041,086	9,271,872	8,017,220	9,824,342	10,039,076

The increase over last fiscal year being $214,734.

Details of Excise Revenue accrued during the undermentioned years.

	1.	2	3	4.	5.
	1896.	1897.	1898.	1899.	1900.
	$	$	$	$	$
Spirits....	4,011.288	4,772,369	3,593,980	4,609,619	4,821,218
Malt liquor	6,748	6,805	6,851	6,807	7,174
Malt.. ..	781,554	1,032,727	589,896	849,468	910,537
Tobacco..	2,351,899	2,557,011	2,894,285	3,320,168	3,281,640
Cigars..	660,937	690,280	688,798	781,319	825,643
Petroleum....	40,323	42,018	44,648	46,060	5,505
Manufactures in bond	49,269	37,237	32,598	49,572	30,192
Seizures	8,000	3.363	7,373	10,713	6,071
Other receipts	26,150	17,965	21,163	24,192	34,132
Methylated spirits	20,571	22,267	36,891	25,049	9,838
Totals	7,956,739	9,182,042	7,916,483	9,722,967	9,931,950

The quantity of spirits produced during the year was 2,658,557 proof gallons, as compared with 3,443,965 proof gallons produced in the previous fiscal year. The raw material used in its production being as follows :—

	Lbs.
Malt	3,134,144
Indian corn.	33,737,264
Rye	7,590,259
Wheat	650
Oats.	421,618
Barley..	26,240

The transactions of the several distilleries will be found stated in detail in Appendix A (Statement No. 3), pages 64 and 65.

		Proof Galls.
There were on the 1st July, 1899, in process of manufacture		116,486
Manufactured during the year		2,658,557
Returned to distilleries for re-distillation—Duty paid	990	
" " " In bond	470,315	
		471,305
Received into distilleries from other sources—Duty paid		2,823
Total		3,249,171

This was disposed of as follows :—

	Proof Gallons.
Placed in warehouse under crown lock	3,113,001
Fusel-oil written off.	11,846
Deficiency arising from rectification	105
Remaining in process of manufacture, June 30, 1900, by actual stock taking	124,219
Total	3,249,171

The following statement shows the warehousing transactions in spirits during the year ended June 30, 1900, and the four preceding years :—

	1	2	3	4	5	6	7	8	9
Fiscal Years.	In Warehouse at beginning of Year.	Warehoused during the year. Ex-distillery.	Otherwise Warehoused.	Taken for consumption.	Exported.	Used in Bonded Factories.	Otherwise accounted for.	For Re-Distillation.	In Warehouse at end of year.
	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.
1895 6.	11,434,857	4,479,209	118,511	2,332,859	140,304	362,453	161,149	166,098	12,869,714
1896-7.	12,869,714	2,596,485	125,692	2,779,946	158,943	340,176	212,500	214,212	11,886,114
1897-8.	11,886,114	1,766,030	94,798	1,874,479	87,471	321,515	135,318	68,123	11,260,036
1898-9.	11,260,036	3,914,094	145,805	2,404,599	120,161	360,876	138,300	475,007	11,820,992
Totals. . . .	47,450,721	12,755,818	484,806	9,391,883	506,879	1,385,020	647,267	923,440	47,836,856
Annual average of four years ended June 30 1899.	11,862,680	3,188,955	121,202	2,347,971	126,720	346,255	161,817	230,860	11,959,214
1899-1900.	11,820,992	3,113,001	135,196	2,523,576	138,637	345,312	131,222	470,315	11,460,127

The quantities exported being as follows :—

	Proof Gallons.
1895–6.	140,304
1896–7.	158,943
1897–8.	87,471
1898–9.	120,161
1899–1900.	138,637

The following statement exhibits the entire quantities upon which duties were collected during the several years recited therein. The total column will be found to accord with the figures shown in Financial Statement No. 13, page 23 :—

Fiscal Years.	Canadian Spirits.		Imported Spirits used in Bonded Factories. Paid difference between Customs and Excise Duty.	Total quantities upon which duty was collected.	Memorandum of Revenue accrued including License Fees.
	Paid duty Ex-distillery.	Paid duty Ex-warehouse.			
	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	$
1895-6	11,908	2,332,859	118,291	2,463,058	4,011,287
1896-7	2,568	2,779,946	125,378	2,907,892	4,772,370
1897-8	3,866	1,874,479	94,681	1,973,026	3,593,980
1898-9	5,571	2,404,599	137,825	2,547,995	4,609,619
Totals	23,913	9,391,883	476,175	9,891,971	16,987,256
Annual average of four years ended June 30, 1899	5,978	2,347,971	119,044	2,472,993	4,246,814
1899-1900	493	2,523,576	134,969	2,659,038	4,821,218

SESSIONAL PAPER No. 12

MALT :

The following statement shows the transactions in malt during the year 1899–1900, and the four preceding years :—

Fiscal Years.	1 In Warehouse at beginning of Year.	2 Manufactured during the Year.	3 Increase by absorption.	4 Taken for consumption.	5 Exported.	6 Otherwise accounted for.	7 In Warehouse at end of Year.	8 Memorandum of Revenue accrued, including License Fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1895-6.........	23,070,272	52,919,241 *1,976,661	769,756	51,690,278	379,114	325,308	26,341,230	781,554
1896-7.........	26,341,230	47,544,706 *2,368,763	572,765	68,443,353	377,771	339,698	7,666,642	1,032,727
1897-8.........	7,666,642	45,478,529 *2,497,134	678,738	38,954,715	228,000	561,782	16,576,546	589,896
1898-9.........	16,576,546	61,020,839 *2,387,782	552,363	56,212,822	301,774	2,240,747	21,782,187	849,468
Totals.. .	73,654,690	206,963,315 *9,230,340	2,573,622	215,301,168	1,286,659	3,467,535	72,366,605	3,253,645
Annual average of four years ended June 30, 1899.....	18,413,673	51,740,829 *2,307,585	643,405	53,825,292	321,665	866,884	18,091,651	813,411
1899-1900......	21,782,187	61,497,929 *2,786,630	730,799	60,284,064	327,950	1,663,296	24,521,335	910,538

TOBACCO :

The following table shows the transactions during the Fiscal Years ended June 30, 1896, 1897, 1898, 1899 and 1900 respectively, in Tobacco, Snuff and Cigarettes.

Fiscal Years.	1	2	3	4	5	6	7	8	9	10
	In Warehouse, July 1.	Manufactured during the year.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse June 30.	Raw Leaf taken for consumption.	Canadian Twist taken for consumption.	Total Tobacco taken for consumption.	Duty collected thereon, including License fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1895-6	1,336,568	10,632,155	9,633,585	231,469	47,090	2,056,579	287	51,903	9,685,775	2,351,899
1896-7	2,056,579	8,797,845	10,323,472	197,310	50,622	283,020	*648,688	78,370	11,050,530	2,557,012
1897-8	283,020	10,519,500	9,001,157	174,595	33,526	1,593,242	8,506,199	55,379	17,562,735	2,894,285
1898-9	1,593,242	10,358,434	10,166,084	136,431	25,967	1,623,194	10,239,863	84,115	20,490,062	3,320,168
Totals	5,269,409	40,307,934	39,124,298	739,805	157,205	5,556,035	19,395,037	269,767	58,789,102	11,123,364
Average for four years ended June 30, 1899	1,317,352	10,076,984	9,781,075	184,951	39,301	1,389,009	4,848,759	67,442	14,697,276	2,780,841
1899-1900	1,623,194	11,146,218	11,106,124	170,185	60,105	1,432,998	9,352,535	58,914	20,517,573	3,281,639

*Duty imposed on Raw Leaf, April, 1897.

CIGARS :

The following statement shows the transactions in Cigars during the fiscal year ended June 30, 1900, and the four preceding years :—

Fiscal Years.	1. In Warehouse July 1.	2. Manufactured during the Year.	3. Assessment to bring production up to Standard.	4. Taken for consumption.	5. Exported.	6. Otherwise accounted for.	7. In Warehouse June 30.	8. Memorandum of Revenue accrued including License Fees.
	No.	No.	No.	No.	No.	No.	No.	$
1895-96	14,955,785	106,171,691	20,949	108,290,260	161,025	12,950	12,684,190	660,940
1896-97	12,684,190	109,234,900	5,575	113,276,105	145,425	....	8,503,135	690,280
1897-98	8,503,135	116,399,610	38,358	113,132,223	131,300	37,225	11,640,355	688,797
1898-99	11,640,355	133,134,122	9,106	128,919,098	88,250	....	15,776,235	781,319
Totals.	47,783,465	464,940,323	73,988	463,617,686	526,000	50,175	48,603,915	2,821,336
Annual average of four years ended June 30, 1899	11,945,866	116,235,081	18,497	115,904,421	131,500	12,544	12,150,979	705,334
1899-1900	15,776,235	139,389,477	8,430	138,041,707	189,975	17,300	16,925,160	825,643

The revenue derived from goods manufactured in bond during the past five years has been as follows :—

1895–96	$49,269
1896–97	37,237
1897–98	36,977
1898–99	49,572
1899–1900	39,839

INSPECTION OF PETROLEUM.

The following statement shows the number of packages of each kind of petroleum inspected from July 1 to August 31, 1899, and the fees collected thereon :—

	Packages.	Fees.
Canadian	45,131	$3,546 50
Imported	30,764	1,956 21
	75,895	5,502 71

The following statement shows the quantity of Canadian petroleum and naphtha inspected from Sept. 1, 1899, to June 30, 1900, under new act.

	Gallons.
Petroleum	10,323,076
Naphtha	1,273,359
	11,596,435

PUBLIC WORKS :

The revenue accrued from this source was as follows :—

	1898–99.	1899–1900.
Hydraulic and other rents	$3,717	$3,528
Minor public works	1,373	1,838

CULLING TIMBER :

The amount accrued upon culling of timber was during 1899–1900, $8,154.74 ; the cost of the service (including $5,500 for annuities to retired cullers) having been $17,403.10.

WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT :

The usual special reports in relation to these services have been prepared, containing full statistical information.

The aggregate revenue accrued from these services was $88,207.04.

The cost of the three services being $96,091.44.

PREVENTION OF ADULTERATION OF FOOD AND AGRICULTURAL FERTILIZERS:

The usual supplementary report in relation to this service will be submitted containing details of the work done and the report of the analysts.

INSPECTION OF STAPLES:

The usual statistics in relation to this service will be found in Appendix B.

METHYLATED SPIRITS:

The quantity of methylated spirits manufactured during the year was 81,319 proof gallons; 81,095 gallons were sold. A statement of details appears on pages 56 and 101

Appendix C contains, as usual, the details concerning illicit stills seized during the year.

Appendix D shows the amount of Excise Revenue collected at each out-office and under various headings, separately.

I have the honour to be, sir,

Your obedient servant,

E. MIALL,
Commissioner.

OTTAWA, September 22, 1900.

APPENDIX A.

TABLE showing the Annua Consumption per head of the undermentioned articles paying Excise and Customs Duties, and the Revenue per head derived annually.

Years.	Dominion of Canada.									
	Quantity.					Duty.				
	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.
	Galls.	Galls.	Galls.	Lbs.	Galls.	$	$	$	$	$
1869	1·124	2·290	·115	1·755	·575	·761	·092	·037	·193	·041
1870	1·434	2·163	·195	2·190	1·103	·962	085	·049	·259	·061
1871	1·578	2·490	·259	2 052	1·591	1·059	095	·056	·336	·077
1872	1·723	2·774	·257	2·481	1·302	1·160	·108	·070	·422	·076
1873	1·682	3·188	·238	1·999	1·387	1·135	·120	·066	·350	·084
1874	1·994	3·012	·288	2·566	1·618	1·363	·119	·086	·442	·103
1875	1·394	3·091	·149	1·995	1·589	1·127	·114	·069	·428	·098
1876	1·204	2·454	·177	2·316	1·360	1·182	·098	·075	·513	·105
1877	·975	2·322	·096	2·051	1·103	·949	·109	·057	·446	·084
1878	·960	2·169	·096	1·976	....	·927	·147	·052	·439	.....
1879	1·131	2·209	·104	1·954	....	1·005	·125	·057	·449	.....
1880	·715	2·248	·077	1·936	....	·772	·081	·055	·428	.....
1881	·922	2·293	·099	2·035	....	·990	·081	·073	·443	.....
1882	1·009	2·747	·120	2·150	....	1·084	·098	·092	·485	.....
1883	1·090	2·882	·135	2·280	....	1·186	·103	·097	·473	.....
1884	·998	2·924	·117	2·476	....	1·074	·104	·082	·365	.....
1885	1·126	2 639	·109	2·623	....	1·198	·111	·074	·393	.....
1886	·711	2·839	·110	2·052	....	1·007	·091	·074	·502	.....
1887	·746	3·084	·095	2·062	....	1·045	·100	·066	·514	.....
1888	·645	3·247	·094	2·093	....	·944	·110	·066	·509	.....
1889	·776	3.263	·097	2·153	....	1·107	·114	·068	·529	.....
1890	·883	3.360	·104	2·143	....	1 257	·121	·072	·539	.....
1891	·745	3·790	·111	2·292	....	1·094	·137	·080	·590	.....
1892	·701	3·516	·101	2·291	....	1·156	·211	·075	·680	.....
1893	·740	3·485	·094	2·314	....	1·235	·218	·070	·691	..
1894	·742	3·722	·089	2·264	....	1·235	·205	·060	·683	.....
1895	·666	3·471	·090	2·163	....	1.124	·161	·056	·645	.....
1896	623	3·528	·070	2·120	....	1·159	·164	·047	·639	.....
1897	·723	3·469	·084	2·243	....	1·341	·213	·041	·671	.....
1898	·536	3·808	·082	2·358	......	1·306	·126	·041	·615	
1899	·661	3·995	·086	2·174	....	1·367	·174	·045	·841	.....
1900	·701	4·364	·085	2·300	....	1·455	·185	·044	.853	.....
Average	·989	3·026	·126	2 183	....	1·108	·129	·064	.511	

APPENDIX B.

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected under provisions of 37 Vic., Cap. 45 during the year ended June 30, 1900, and the Fees accrued thereon, as returned to the Department of Inland Revenue by the respective Inspectors.

WHEAT AND OTHER GRAIN.

WHEAT.

Districts.	Manitoba Hard.				Northern.			Spring.						Goose.				Frosted.		
	Extra	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	Dried	Feed.	Rejected.	American No. 2.	No. 1.	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	...	19,260	....	....	28,740	....	.....	132,900	35,700	....	......	......	48,000	.....	114,000	.. ..	...	... ...	......	... .
Peterboro'	... .	....	20,000	... ..	....	23,000	.....	80,558	33,582	...	..	....	....	930	36,071	......	......	....	......	.
Toronto	.....	....	....	....	....	....	.. .	900	5,400	......	......	......	......	5,400	75,600	12,300	7,800	....	......	... ..
Port Arthur	.. ...	223,300	99,440	880	264,880	14,520	....	440	.....	880	.. .	8,800	.....	......	....	... ..	. ..	220	. ....	.....
Winnipeg	3,040	8,415,280	1,540,140	619,420	383,420	29,260	12,920	10,260	. ..	.....	3,040	411,400	...	.....	... ...	... ..	.. ...	133,760	44,080	12,540
Totals	3,040	8,657,840	1,659,580	620,300	677,040	66,780	12,920	225,058	74,682	880	3,040	420,200	48,000	6,330	225,671	12,300	7,800	133,980	44,080	12,540

WHEAT AND OTHER GRAIN—*Continued.*

WHEAT—*Continued.*

Districts.	Mixed Winter.				White Winter.					Red Winter.					Extra White Winter.	White Fyfe.		No Grade.	Condemned.
	No. 1.	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.	American No. 2. Hard Winter	Rejected	No. 1.	No. 2.	No. 3.	Rejected	Feed.		No. 1.	No. 2.		
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	.....	1,800	.... .	600	5,160	600	. ...	335,940	......	4,800	19,800	....	....	...	.. .	......	....	600	....
Peterboro'	7,913	. ..	..	......	2,420	600	......	....	.. .	8,744	2,100	....	...	. .	276	..... .	......	... .	... .
Toronto	....	17,600	6,900	3,000	3,500	9,600	2,700	. ... .	1,500	......	65,000	12,000	6,600	.. ..	...	....	.	....	....
Port Arthur	....	. ....	......	....	. .....	......	.....	......	.....	......	. ..	....	... .	......	..	......	880	S'pg. 126,060	S'pg. 11,660
Winnipeg	......	......	. ...	. ...	....	.....	......	... ..	....	....	. ..		....	1,520	. . .	13,300	1,520	324,520	27,740
Totals	7,913	19,400	6,900	3,600	11,080	10,800	2,700	335,940	1,500	13,544	86,900	12,000	6,600	1,520	276	13,300	2,400	451,180	39,400

STATEMENT showing the Quantity of certain Staple Articles of Canadian Commerce, &c.—*Continued.*

WHEAT AND OTHER GRAIN—*Continued.*

Districts.	Other Grain.																			
	Indian Corn.				Buckwheat.				Oats.											
	No. 2.	American No. 2. White Corn.	No. 3.	Rejected	No. 1.	No. 2.	No Grade	Rejected	Feed and No Grade	No. 1.	No. 2.	No. 3.	Mixed No. 1.	Mixed No. 2.	Mixed No. 3.	Mixed Rejected	White Oats No. 1.	White Oats No. 2.	Rejected	American No. 2.
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	4,805,572	1,103,480	46,704	2,240		132,192	2,640	9,640		229,488	1,271,172	301,410	1,360						69,666	220,150
Peterboro'					1,536	4,979				269,111	2,524									
Toronto	1,680		336	336		32,000				220,000	472,000	4,600		37,768	1,596	824				
Port Arthur																				
Winnipeg									Feed 22,260 N.G. 1,020	680				64,600			17,680	111,960	2,720	
Totals	4,807,252	1,103,480	47,040	2,576	1,536	169,171	2,640	9,640	23,280	719,279	1,745,696	306,010	1,360	102,368	1,596	824	17,680	111,960	72,386	220,150

WHEAT AND OTHER GRAIN—*Concluded.*

Districts.	Other Grain—*Concluded.*																				
	Rye.					Barley.											Peas.				Fees.
	No. 1.	No. 2.	No. 3	Rejected.	American No. 2.	No. 1.	No. 2.	No. 3.	No. 4	No. 3 Extra.	Feed.	American Feed.	Rejected.	Flax No. 1.	Flax No. 2	Flax Rejected.	No. 1.	No. 2.	No. 3.	Rejected	
	Ctls.	Ctls.	Ctls.	Ctls	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	$ cts.
Montreal	6,460	227,920	560	1,120	62,864	241,376	298,252	33,600	6,624	38,496	16,272	180,908	288				97,140	1,003,920	48,120	25,160	9,579 38
Peterboro'	6,752	10,116				71,170	37,877										34,151	20,907			638 30
Toronto		16,088	672			102,256	150,368			74,152	31,952		2,900				35,900	367,500	69,300	11,200	4,553 40
Port Arthur																					1,641 35
Winnipeg								16,320		1,360	13,280		680	12,580	7,480	3,740					12,989 20
Totals	13,212	254,124	1,232	1,120	62,864	414,802	486,497	49,920	6,624	114,008	61,504	180,908	3,868	12,580	7,480	3,740	167,191	1,392,327	117,420	36,360	29,401 63

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected, &c.—*Continued.*

PICKLED FISH.

Districts.	Salmon.			Sea Trout.		Mackeral.		Herrings.		Gaspereaux and Alewives.	Codfish.		Other Fish.		Fees.
	Tcs.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	Brls.	½ Brls.	$ cts.
Quebec..........	4	269	9	47	5	....	....	671	11	......	....	2,469	330	1	244 69
Carleton, N.B....	....	....	..	....	....	....	....	....	78	482	....	....	....	.	26 44
St. John	....	....	..	....	....	....	.. .	1,205	13,088	645	....	.....	....	..	485 14
Lunenburg	....	....	..	....	....	6	8	....	......	.....	...	......	....	..	1 10
Totals........	4	269	9	47	5	6	8	1,876	13,177	1,127	....	2,469	330	1	757 37

FISH OIL.

Districts.	Seal Oil.				Whale Oil.	Porpoise Oil.		Cod Oil.						Hake Oil.	Herring Oil.		Fees.
	No.2 Pale.	No. 3 Straw.		No.4 Bro'n.	No.2 Straw	No.2 Straw.		A.			B.			A.	A.		
	Tcs.	Tcs.	Brls.	Brls.	Brls.	Tcs.	Brls.	Pun.	Tcs.	Brls.	Pun.	Tcs.	Brls.	Brls.	Brls.	Tcs.	$ cts.
Quebec..........	.....	157	..	12	.....	2	....	....	291	....	..	4	....	... .	....	2	70 30
St. John.........	......	..	..	....	20	. .	....	.	....	130	..	:.	....	655	3	....	165 20
Lunenburg.......	....	....	..	.....	.. .	....	....	...	337	....	..	1	...	...	.. .	....	67 60
Totals......	......	157	..	12	20	2	.. .	....	628	430	..	5	....	655	3	2	303 10

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected, &c.—*Concluded.*

BEEF AND PORK.

District.	Beef.		Pork.			Fees.
	Mess.	Prime Mess.	Mess.		Rejected.	
	Brls.	Brls.	½ Brls.	Brls.	Brls.	$ cts.
Quebec						

LEATHER AND HIDES.

District.	Leather	Hides.			Calf Skins.			Fees.
	No. 1.	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 3.	
	Sq. ft.							$ cts.
Hamilton	.....	12,219	4,218	634	.....	.....	...	853 55
Kingston	....	4,825	640	350	.. .	....	. . . .	291 70
Toronto	......	51,251	23,136	6,258	......	. . ..	...	4,032 55
Lévis	....	4,336	1,523	30	....	. .	....	294 45
Montreal	....	64,220	16,893	12,534	. ...	....	.. ...	4,659 13
Quebec	6,336	20,536	7,906	963	......	......	......	1,545 12
St. John	....	6,794	481	169	....	..	.....	372 45
Totals	6,336	164,181	54,797	20,938	.....	...	. . .	12,048 95

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX C.

STATEMENT of Seizures on Account of Illicit Manufactures for fiscal Year ended June 30, 1900.

Divisions.	Number.	Names.	Schedule Value.	Residences.	Dates.	Remarks.
Peterborough	24	M. J. Healy	20 00	Township	June 27, '00	Department of Justice for prosecution.
Toronto	370	Arch. M. Vicar	17 85	Muskoka	Nov. 14, '00	Fined $100 or 3 months' imprisonment.
	371	Edgar J. Brooks	2 00	Sinclair Towns'p	Jan. 11, '00	No action taken.
	373	Edwin Hurrin	0 10	Georgina, York Co.	Mar. 22, '00	"
Montreal	991	Jos. Germain	10 10		July 13, '99	Sentenced to $100 fine or 6 months in jail.
	993	Jos. Lafleur	122 75	Montreal	Aug. 12, '99	No conviction.
	996	Michel Gauvin	61 37		" 15, '99	Acquitted.
	1000	Gédéon Bertrand	1 00	St. Martin	Sept. 18, '99	Sentenced to $100 fine and costs or 3 mos. in jail.
	1010	Samuel Thibault	2 25	Montreal	Oct. 2, '99	Penalty of $100 inflicted.
	1013	Babylas Laporte	14 10	"	" 10, '99	Sentenced to $100 fine or 6 months in jail.
	1015	In possession of Chief of Police Clermont.	1 50	St. Louis of Mile End	" 13, '99	Penalty of $10 inflicted.
	1017	Osias Bissonnette	5 75	Montreal	" 18, '99	Penalty of $100 inflicted.
	1019	In possession of J. M. Massey, Johny Charette, Elie Gagnon	2 00	St. Henri	" 28, '99	Warrant issued for prisoner's arrest.
	1023	Osias Bissonnette	4 05	Montreal	Nov. 8, '99	Sentenced to $100 fine and costs or 6 mos. in jail.
	1024	Arsène Charest	13 65	"	" 9, '99	Penalty of $100 inflicted.
	1025	C. Rochon	0 80	"	" 9, '99	Penalty of $50 inflicted.
	1026	Camille Gauthier	22 50	"	" 20, '99	Paid $100 penalty.
	1028	Félix Bigaouette	2 00	"	Dec. 8, '99	"
	1030	Pierre Desjardins	14 30	Franklin Centre.	" 9, '99	$100 penalty imposed.
	1034	C. Rochon	5 95	Montreal.	Jan. 23, '00	No action taken.
	1036	Isidore Malartre	2 00		Feb. 5, '00	"
	1038	Odilon Perrault	4 00		Mar. 1, '00	"
	1042	Pierre Pelletier	20 00		" 17, '00	Fine of $100 imposed.
	1043	J. W. Foucher	330 69		April 18, '00	" $200 "
	1045	G. Levasseur	18 17		" 20, '00	Sentenced to $100 fine and costs or 6 mos. in jail.
	1046	P. Hamelin	27 00		" 26, '00	Department of Justice for prosecution.
	1047	H. Archambault	12 50		July 10, '00	Fine of $100 imposed.
Quebec	500	Jos. Houde	3 00	Baie de Mille Vaches.	Aug. 12, '99	Department of Justice for prosecution.
	501	Paul Nadeau	4 00	St Onge	" 10, '99	" "
	502	Vitaline Côté.	2 00	Rimouski.	Oct. 7, '99	No action taken.
	503	Joseph Rodrique	10 00	St. Benoit (Beauce)	Jan. 11, '00	Defaulter fled to United States.
	509	Adelard Roy	11 50		Feb. 23, '00	Referred to Department of Justice.
	510	Johnny Desbiens	...	Mille Vaches	" 24, '00	Prosecution authorized.
	512	F. Malouin	15 85	St. Sauveur.	April 17, '99	Fine of $100 imposed.

STATEMENT of Seizures on account of Illicit Manufactures for Fiscal Year ended June 30, 1900—*Concluded.*

Divisions.	Number.	Names.	Shedule Value.	Residences.	Dates.	Remarks.
Sherbrooke....	191	O. Langlois.........	4 00	St. John, P.Q...	Sept. 30, '00	Department of Justice for prosecution.
	196	John Hall......	8 95	Lake Memphramagog......	Feb. 23, '00	No action taken.
St. Hyacinthe.	...	Zotique Berthiaume.	2 00	....	Feb. 26, '00	Sentenced to $100 fine and 1 month in jail or in default to 5 mos. in jail.
Sorel	77	Paul Burelle........	18 00	Beloeil.........	April 4, '00	Fined $100 and costs or in default to 3 months in jail.
Three Rivers..	114	Jos. Dostaler....	4 00	St. Maurice. ...	" 11, '00	Mitigated penalty of $25 imposed.
St. John, N.B.	29	Geo. Gothers.......	.....	Acadiaville......	Sept. 29, '99	Paid fine of $25.
Halifax.......	181	Indian Reservation..	53 75	Beech Hill......	" 11, '99	No action taken.
	182	Joseph O'Neill.... / Adrien Doucet....	15 60	....	Jan. 17, '00	Acquitted.
Pictou........	84	Dougald McEachen / Allan McEachen..	26 75	North East Mabou......	July 24, '99	D. McEachen was sentenced to $100 fine and 3 mos. in jail, A. McEachen was fined $100 and 30 days in jail.
	85	Found in Woods...	15 00	The Murray, P.O	Aug. 25, '99	No action taken.
	86	Operator unknown..	20 00	....	" 31, '99	"
	87	" ..	22 00	Cape Mabou....	Dec. 13, '99	"

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX D.

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out offices, during the Fiscal Year ended June 30, 1900.

Divisions.	Out Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Deseronto		718 23			1,985 50						2,703 73
	Picton		2,933 95									2,933 95
	Trenton		5,930 82									5,930 82
Brantford	Embro										10 00	10 00
	Ingersol	150 00				497 30	1,625 70				10 00	2,283 00
	Norwich	50 00							2,260 38	600 00	10 00	2,920 38
	Paris	75 00				383 50	1,134 30				10 00	1,602 80
	Port Dover	175 00							1,084 27	300 00	10 00	1,569 27
	Port Rowan										10 00	10 00
	Simcoe	75 00				821 04	2,485 50				10 00	3,391 54
	Tilsonburg	100 00			2,163 63						10 00	2,273 63
	Woodstock	145 00	5,989 87		2,590 57	386 60	1,413 60	13 10		1,128 84	25 00	11,692 58
Guelph	Berlin	470 00	33,540 91		3,449 70	11,382 45	21,960 42					70,803 48
	Galt	450 00			1,654 02	569 70	1,752 30					4,426 02
	New Hamburg	50 00			4,207 50							4,257 50
	Preston	250 00			3,495 36	717 90	2,152 50					6,615 76
	Salem	50 00										50 00
	Waterloo	475 00			17,612 15	1,406 30	5,719 50					25,212 95
	Waterloo Distillery	250 00	381,729 34		2,850 00					2,861 82		387,691 16
Hamilton	Dundas	200 00			30,863 46							31,063 46
	Grenville	150 00			5,419 53							5,569 53
Kingston	Napanee	50 00	7,544 55			3,136 00					40 00	10,770 55
London	Alvinston										10 00	10 00
	Aylmer										10 00	10 00
	Dutton										10 00	10 00
	Forest										10 00	10 00
	Glencoe										10 00	10 00
	Lucan										5 00	5 00
	Parkhill										10 00	10 00
	Petrolea	21 00	8,150 68					19 60			25 00	8,216 28
	Sarnia	111 00	17,110 38			13,042 50		989 40		84 74	25 00	31,363 02
	St. Thomas	220 00	5,104 01		909 00	2,983 84	11,157 30	46 80			25 00	20,445 95
	Strathroy	120 00	2,958 79		5,040 00	172 12					10 00	8,300 91
	Watford										10 00	10 00

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out offices, during the Fiscal Year ended June 30, 1900—*Continued.*

Divisions.	Out Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Owen Sound	Collingwood	126 00	3,696 79			19,059 75						22,882 51
	Kincardine	10 00										10 00
	Meaford	20 00	1,275 06			2,901 88						4,196 94
	Nuestadt	100 00			3,498 07							3,598 07
	Walkerton	175 00			4,458 83		646 20					5,280 03
Perth	Almonte										25 00	25 00
	Arnprior	40 00	7,034 49								25 00	7,099 49
	Carleton Place										25 00	25 00
	Eganville	20 00	2,037 40			1,856 50					20 00	3,933 90
	Mattawa										10 00	10 00
	North Bay										25 00	25 00
	Pakenham										10 00	10 00
	Pembroke	135 00	12,698 80			9,766 45	915 84			202 00	25 00	23,743 09
	Renfrew	20 00	6,052 74			467 75					20 00	6,560 49
	Smith's Falls							16 20			50 00	66 20
	Sudbury	20 00	6,371 29								25 00	6,416 29
Peterborough	Cobourg	70 00	5,634 71								35 00	5,739 71
	Lindsay	50 00									35 00	85 00
	Port Hope	270 00	2,300 36		7,119 60						25 00	9,714 96
Prescott	Brockville	382 50	7,133 17		4,540 50	1,472 91	4,662 60				25 00	18,216 71
	Gananoque	40 00	4,092 12								25 00	4,157 12
St. Catharines	Cayuga										10 00	10 00
	Dunnville	85 00	469 76			140 07	449 10				25 00	1,168 93
	Grimsby										10 00	10 00
	Niagara										10 00	10 00
	Niagara Falls	75 00				242 40	876 70				25 00	1,219 10
	Port Colborne	100 00			4,179 50							4,279 50
	Port Dalhousie										10 00	10 00
	Thorold	20 00	782 28								10 00	812 28
	Welland	95 00	1,690 02			88 40	430 80	9 30			10 00	2,323 52
Stratford	Goderich	170 00	3,685 86		2,003 25							5,859 11
	Listowel	125 00			2,595 00	993 90	3,130 00	43 10				6,887 00
	Palmerston	200 00			17,507 52							17,707 52
	St. Mary's	20 00	3,659 98			2,916 35						6,596 33
Toront	Barrie	220 00	3,109 31		4,595 25							7,924 56
	Hornby	100 00			3,013 50							3,113 50
	Orillia	100 00			907 92							1,007 92
	Sault Ste. Marie	95 00	297 01			5,175 60	672 60					6,240 21

	Whitby							7 40				7 40
Windsor	Chatham	115 00	19,960 54		384 75	2,861 65	3,283 80	2 00			25 00	26,632 74
	Kingsville	25 00				45 00						70 00
	Leamington	172 50				6,959 14	1,614 30					8,745 94
	Ridgetown	105 00	2,607 23			222 10	646 50					3,580 83
Joliette	Berthierville	250 00	191 92									441 92
Montreal	St. Jérôme	95 00	11,324 37			7,761 80	17,184 90					36,366 07
	St. Thérèse	84 00			287 28	392 50					10 00	773 78
	Valleyfield	20 00	24,779 76				84 00					24,883 76
Quebec	Chicoutimi	95 00	1,431 39			93 30	24 00				10 00	1,653 69
	Gaspé	40 00	839 03			237 50						1,116 53
	Paspébiac	20 00				225 00						245 00
	Rivière du Loup	40 00	13,416 90								10 00	13,466 90
Sherbrooke	Granby	190 00				113,482 60	20,783 38					134,455 98
	St. Johns	140 00	20,919 37			127 10	306 75	0 30	4,392 33	558 00		26,443 85
Trois-Rivières	Maskinongé	75 00				509 66	2,452 23					3,036 89
Victoriaville	Drummondville	75 00				2,346 20	6,211 98	7 00			10 00	8,650 18
St. John, N.B.	Bathurst		1,371 62			1,871 50						3,243 12
	Fredericton	20 00				15,905 50					25 00	15,950 50
	Moncton	40 00				16,268 75		170 85			25 00	16,504 60
	Newcastle	20 00	169 86			5,619 51						5,809 37
	Sackville	20 00				2,304 50					10 00	2,334 50
	St. Stephens	75 00				2,770 00	1,266 60				25 00	4,136 60
	Sussex	40 00	63 13			2,369 00					10 00	2,482 13
	Woodstock	40 00	149 60			232 50					20 00	442 10
Halifax	Amherst	20 00	2,574 89			561 62						3,156 51
	Truro	20 00				8,103 25				1 00		8,124 25
	Yarmouth	135 00				8,920 10	314 70	1 75		120 00	20 00	9,511 55
Pictou	Antigonish	40 00				2,124 75				10 00		2,174 75
	New Glasgow	25 00				2,910 50						2,935 50
	North Sydney					5,130 00		4 90			25 00	5,159 90
Winnipeg	Brandon	240 00	22,979 48		140 57	3,023 90	2,761 35				25 00	29,170 30
	Fort Francis	20 00	1,490 84									1,510 84
	Gretna	20 00	2,534 96			778 63						3,333 59
	Morden										10 00	10 00
	Neepawa										5 00	5 00
	Portage la Prairie	60 00	14,691 88			2,897 74					25 00	17,674 62
	Prince Albert	120 00	878 62		554 73	85 49					10 00	1,648 84
	Rat Portage	130 00	25,114 30		1,554 68						25 00	26,823 98
	Regina										25 00	25 00
	Selkirk	20 00	1,683 40								10 00	1,713 40
	Virden	20 00	10,684 26		48 75							10,753 01
Calgary	Edmonton	210 00	9,030 59		1,174 28	4,262 75				5 31	25 00	14,707 93
	Lethbridge	30 00	2,747 34							1 35		2,778 69
	Macleod	20 00	753 94									773 94
Vancouver	Atlin	50 00										50 00
	Cascade City	20 00	4,234 39									4,254 39
	Cranbrook	50 00	11,419 20									11,469 20
	Fort Steele	50 00			1,715 56							1,765 56
	Golden	20 00	3,800 39									3,820 39

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out offices, during the Fiscal Year ended June 30, 1900—*Concluded.*

Divisions.	Out Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Vancouver—	Grand Forks	220 00	7,906 47		693 60							8,820 07
Concluded.	Greenwood	150 00	15,744 84		2,086 37	258 26						18,239 47
	Kamloops	145 00	6,626 43		658 92	1,822 24	4,617 00					13,869 59
	Kaslo	285 00	6,323 54		775 05	724 50	108 00					8,216 09
	Kelowna	65 00				788 32	1,197 75					2,051 07
	Moyle City	50 00										50 00
	Nelson	280 00	38,939 06		4,688 75	7,473 57	3,605 10	44 60				55,031 08
	New Westminster	145 00			2,471 06	835 05	1,835 52					5,286 63
	Revelstoke	120 00	5,327 49		910 99	332 50						6,690 98
	Rossland	315 00	21,594 48		7,832 97	279 00	846 90	15 00		383 90		31,267 25
	Trail	50 00			837 12							887 12
Victoria	Nanaimo	320 00	5,431 73	115 00	8,385 62	910 60	2,220 60			13 00		17,396 55
		11,782 00	863,469 92	115 00	169,874 91	317,394 32	132,550 32	1,391 30	7,736 98	6,269 96	1,205 00	1,511,789 71

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

FINANCIAL RETURNS, 1899-1900

DR. — No. 1.—GENERAL REVENUES ACCOUNT, 1899–1900. — CR.

Memo. of Refunds deducted below.	Amounts deposited to the credit of the Receiver General.	Authorized abatements.	Balances due June 30, 1900.	Totals.	Services.	Revenues of previous Years not collected July 1, 1899.	Revenues accrued, 1899-1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
126,816 13	9,935,518 82	....	42,854 26	9,978,373 08	Excise and Seizures, per Statement No. 3..	56,260 94	9,922,112 14	9,978,373 08
....	3,213 00	1,080 00	27,709 17	32,002 17	Hydraulic and other Rents, per Statement No. 5.	28,474 17	3,528 00	32,002 17
....	1,886 44	....	12,899 41	14,785 85	Minor Public Works, per Statement No. 6.......	12,947 41	1,838 44	14,785 85
....	8,154 74	....	37,795 42	45,950 16	Culling Timber, per Statement No. 7..	37,795 42	8,154 74	45,950 16
....	53,635 04	....	2,155 03	55,790 07	Weights and Measures, per Statements Nos. 19 (A) and 19 (B).	2,709 28	53,080 79	55,790 07
....	21,106 75	....	764 50	21,871 25	Gas Inspection, per Statement No. 21..........	1,196 50	20,674 75	21,871 25
50 00	14,416 75	....	174 75	14,591 50	Electric Light Inspection, per Statement No. 23.	140 00	14,451 50	14,591 50
....	4,754 75	....	....	4,754 75	Law Stamps, per Statements Nos. 10 and 18.....	....	4,754 75	4,754 75
....	....	....	45 04	45 04	Bill Stamps, per Statement No. 9...............	45 04	....	45 04
3 00	643 51	....	....	643 51	Sundry Minor Revenues, per Statement No. 11..	....	643 51	643 51
....	9,838 01	....	....	9,838 01	Methylated Spirits, net receipts.....	....	9,838 01	9,838 01
126,869 13	10,053,167 81	....	....	10,178,645 39		....	10,039,076 63	10,178,645 39
....	126,869 13	....	....	126,869 13	... Less—Refunds as per Statement No. 16...	....	126,869 13	126,869 13
....	9,926,298 68	1,080 00	124,397 58	10,051,776 26	.... Totals........................	139,568 76	9,912,207 50	10,051,776 26

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

Dr.

No. 2.—GENERAL EXPENDITURES

Balances due to Collectors, &c., July 1, 1899.	Expenditures Authorized by the Department. Salaries.	Contingencies.	Seizures.	Cullers' Fees.	Cullers' Annuities.	Balances due by Collectors, &c., June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
747 25	308,721 00	104,433 62	812 20	....	....	367 75	415,081 82
....	5,850 00	1,853 10	....	4,200 00	5,500 00	75 00	17,478 10
....	....	... ...	5,670 67	....	....	....	5,670 67
....	11,265 93	20,329 54	....	....	....	225 81	31,821 28
....	44,710 00	5,016 48	....	....	....	16 66	49,743 14
538 70	47,699 17	20,702 88	2 50	....	....	160 00	69,103 25
201 62	15,009 67	7,778 05	....	....	....	244 56	23,233 90
....	2.347 29	2,679 04	....	....	....	....	5,026 33
1,487 57	435,603 06	162,792 71	6,485 37	4,200 00	5,500 00	1,089 78	617,158 49

Inland Revenue Department,
Ottawa, September 22, 1900.

SESSIONAL PAPER No. 12

ACCOUNT, 1899-1900. Cr.

Services.	Balances due by Collectors, &c., July 1, 1899.	Amounts disbursed by the Receiver General on requisitions of the Department.	Deductions from Salaries for				Balances due to Collectors, &c., June 30, 1900.	Totals.
			Superannuations.	Insurance.	Guarantee.	Retirement.		
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Excise and Seizures, per Statement No. 4........	413 08	406,022 22	5,534 57	71 76	1,115 01	1,876 10	49 08	415,081 82
Culling Timber, per Statement No. 8.....	75 00	17,263 66	102 00	...	....	37 44	....	17,478 10
Excise Seizures distributed, per Statement No. 4, Appendix B...............	....	5,670 67	....	....	....	....	....	5,670 67
Sundry minor expenditures, per Statement No. 12.....	25 81	31,663 57	109 96	.. ..	....	....	21 94	31,821 28
Departmental expenditure, per Statement No. 17. ...	16 66	48,916 98	809 50	.....	....	....	....	49,743 14
Weights and Measures, per Statements Nos. 20 (A) and 20 (B)...............	...	68,094 49	359 24	80 04	138 82	34 96	395 70	69,103 25
Gas Inspection, per Statement No. 22	212 88	22,437 79	168 42	....	94 95	5 00	314 86	23,233 90
Electric Light Inspection, per Statement No. 24.....	......	4,677 73	....	....	....	....	348 60	5,026 33
Totals.	743 43	604,747 11	7,083 69	151 80	1,348 78	1,953 50	1,130 18	617,158 49

E. MIALL,
Commissioner.

EXCISE,

No. 3.—Collection Divisions

Dr. (*For Details, see*

Balances due July 1, 1899.	Amount Accrued during the Year, including License Fees. Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum Inspection Fees.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
824 38	142,866 48	50 00	4,403 69	3,026 10	859 50	29 40	....	50 00
461 69	22,596 29	150 00	12,340 70	7,197 90	23,007 36	40 20	3,377 94	10 00
....	11,525 77	....	....	3,617 13	....	9 90	....	....
373 20	424,120 87	375 00	75,598 69	17,375 55	33,328 92	28 50	....	14 01
620 19	196,022 30	150 00	53,083 04	333,484 99	37,763 04	168 60	2,753 49	72 42
112 30	38,361 14	100 00	56,451 34	21,295 68	24,766 50	79 40	1,431 04	60 00
1,593 26	77,637 44	300 00	65,291 53	67,388 42	163,818 78	1,225 10	....	10 00
2,283 96	220,960 42	125 00	3,395 95	44,830 18	2,062 50	227 80	....	279 67
....	18,715 21	300 00	16,279 98	39,510 08	2,692 20	42 70	....	25 00
9 02	59,194 52	....	100 00	12,090 70	990 84	16 20	....	....
....	19,942 12	200 00	11,891 53	159 80	654 00	....	....	8 41
....	13,445 59	50 00	1,022 37	2,289 25	....	18 00	....	....
....	93,568 75	150 00	23,743 23	1,483 94	4,925 10	48 50	300 00	160 00
277 74	19,057 54	100 00	14,736 21	4,738 12	8,559 30	9 30	....	100 40
277 98	32,287 08	250 00	24,116 30	8,356 78	10,625 52	70 20	....	11 20
1,501 87	615,159 52	650 00	200,294 18	194,845 60	50,063 10	717 30	8,967 44	523 00
1,452 80	261,757 74	150 00	31,707 26	11,019 79	9,031 80	21 07	400 00	300 00
430 25	....	....	....	....	....	....	....	....
10,309 62	2,267,618 79	3,100 00	594,456 00	772,710 01	373,148 46	2,752 17	17,229 91	1,624 11
....	36,219 19	50 00	....	25,235 14	265 09	....	....	....
14,781 40	1,085,501 70	500 00	115,017 69	1,646,487 68	265,779 63	1,300 60	3,679 65	2,400 26
5,154 47	343,282 88	200 00	44,744 86	122,285 74	22,896 32	1 40	3,444 63	879 80
1,063 32	127,373 85	100 00	12,630 59	123,198 65	42,621 49	21 50	4,795 45	210 50
....	22,575 89	....	....	5 75	....	....	....	100 00
35 09	48,627 30	50 00	....	60 42	1,615 76	....	233 48	8 00
1,122 05	49,279 14	....	....	2,981 71	7,686 65	40 00	....	....
....	22,205 62	....	....	2,346 20	6,490 98	7 00	....	15 80
2,110 36	....	....	....	....	....	....	....	....
22,066 69	1,745,065 55	900 00	172,393 14	1,922,601 29	377,355 83	1,370 50	12,153 21	3,614 36
2,548 01	116,582 82	100 00	12,074 46	99,057 46	9,262 50	473 19	809 13	18 40
1,487 40	....	....	....	....	....	....	....	....
4,035 41	116,582 82	100 00	12,074 46	99,057 46	9,262 50	473 19	809 13	18 40
891 90	56,626 02	200 00	36,280 05	100,127 98	4,320 36	320 45	....	529 06
....	....	....	....	27,894 45	....	4 90	....	159 50
5,880 50	....	....	....	....	....	....	....	....
6,772 40	56,626 02	200 00	36,280 05	128,022 43	4,320 36	325 35	....	688 56
642 30	1,726 83	50 00	1,819 80	50,255 10	....	15 00	....	....

SESSIONAL PAPER No. 12

1899-1900.

in Account with Revenues.

Appendix A.) CR.

Other Receipts.	Total Duties accrued.	Total Debits.	DIVISIONS.	Deposited to the credit of the Receiver General.	Balances due June 30, 1900.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
503 50	151,788 67	152,613 05	..Belleville	152,362 23	250 82	152,613 05
940 00	69,660 39	70,122 08	..Brantford.......... ..	69,495 74	626 34	70,122 08
105 00	15,257 80	15,257 80	..Cornwall...	15,257 80	....	15,257 80
2,921 82	553,763 36	554,136 56	..Guelph	553,100 08	1,036 48	554,136 56
1,500 81	625,598 69	626,218 88	..Hamilton	625,708 47	510 41	626,218 88
563 55	143,108 65	143,220 95	..Kingston	143,109 42	111 53	143,220 95
240 06	375,911 33	377,504 59	..London............. ...	375,467 33	2,037 26	377,504 59
415 09	272,296 61	274,580 57	..Ottawa.	273,811 51	769 06	274,580 57
180 00	77,545 17	77,545 17	..Owen Sound...........	77,545 17	....	77,545 17
414 25	72,806 52	72,806 54	..Perth..................	72,465 56	340 98	72,806 54
60 00	32,915 86	32,915 86	..Peterborough	32,915 86	....	32,915 86
70 00	16,895 21	16,895 21	..Port Arthur	16,895 21	....	16,895 21
159 00	124,538 52	124,538 52	.Prescott	124,324 67	213 85	124,538 52
130 30	47,431 17	47,688 91	..St. Catharines..... . . .	47,336 46	352 45	47,688 91
80 00	75,797 08	76,095 06	..Stratford..........	75,786 56	308 50	76,095 06
11,479 60	1,082,699 74	1,084,301 61	..Toronto	1,081,175 63	3,125 98	1,084,301 61
5,444 57	319,832 23	321,285 03	..Windsor	320,807 09	385 28	321,192 37
... .	....	430 23	..Suspense Account......	....	522 89	522 89
25,207 55	4,057,847 00	4,068,156 62	. . *Ontario*.............	4,057,564 79	10,591 83	4,068,156 62
60 00	61,829 33	61,829 33	. Joliette.....	61,756 39	72 94	61,829 33
4,143 49	3,154,810 70	3,169,392 10	..Montreal	3,159,650 86	9,741 24	3,169,392 10
960 00	538,695 63	541,850 10	..Quebec	540,064 54	904 64	540,969 18
728 00	321,680 01	322,743 33	..Sherbrooke.	321,060 13	1,683 20	322,743 33
60 00	22,741 64	22,741 64	..Sorel	22,741 64	....	22,741 64
192 50	50,787 46	50,822 55	..St. Hyacinthe.....	50,603 57	218 98	50,822 55
60 00	60,047 50	61,169 55	..Three Rivers...........	60,865 26	....	60,865 26
40 00	31,105 60	31,105 60	..Victoriaville	31,105 60	....	31,105 60
....	....	2,110 36	..Suspense Account........	....	3,295 57	3,295 57
6,243 99	4,241,697 87	4,263,764 56	... *Quebec*	4,247,847 99	15,916 57	4,263,764 56
600 50	238,778 46	241,326 47	..St. John................	238,924 00	2,392 14	241,316 14
....	....	1,487 40	..Suspense Account........	55 11	1,442 62	1,497 73
600 50	238,778 46	242,813 87	.... .*New Brunswick*......	238,979 11	3,834 76	242,813 87
400 00	198,803 92	199,695 82	Halifax...	199,478 82	217 00	199,695 82
60 00	28,118 85	28,118 85	..Pictou.............	28,118 85	....	28,118 85
....	....	5,860 50	..Suspense Account......	....	5,860 50	5,860 50
460 00	226,922 77	233,675 17	.....*Nova Scotia*	227,597 67	6,077 50	233,675 17
20 00	53,886 73	54,529 03	..Charlottetown, *P. E. I*...	53,559 02	970 01	54,529 03

EXCISE,

No. 3.—Collection Divisions

Dr. (*For Details, see*

Balances due July 1, 1899.	Amount Accrued during the Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum Inspection Fees.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
5,672 21	303,903 97	350 00	29,202 66	197,948 55	29,341 02	230 05	....	48 25
....	23,668 28	150 00	7,282 36	4,262 75	....	1 35	....	5 31
5,672 21	327,572 25	500 00	36,485 02	202,211 30	29,341 02	231 40	......	53 56
5,453 05	194,442 54	1,958 90	35,921 10	67,160 87	22,409 12	315 35	......	72 15
1,329 26	111,783 12	365 00	21,108 24	39,621 02	9,805 60	21 75	....	....
6,782 31	306,225 66	2,323 90	57,029 34	106,781 89	32,214 72	337 10	....	72 15
56,260 94	4,821,217 92	7,173 90	910,537 81	3,281,639 48	825,642 89	5,504 71	30,192 25	6,071 14
.. ..	46,690 54	....	50,090 04	29,134 43	37 50	....	21 62	484 00
....	4,774,527 38	7,173 90	860,447 77	3,252,505 05	825,605 39	5,504 71	30,170 63	5,587 14

Inland Revenue Department,
Ottawa, September 22, 1900.

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in Account with Revenues—*Concluded.*

Appendix A.)

Cr.

Other Receipts.	Total Duties accrued.	Total Debits.	Divisions.	Deposited to the credit of the Receiver General	Balances due June 30, 1900.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
670 00	561,694 50	567,366 71	..Winnipeg...............	566,089 15	1,277 56	567,366 71
130 00	35,500 05	35,500 05	..Calgary, N.W.T	35,500 05	....	35,500 05
800 00	597,194 55	602,866 76	... *Manitoba and N.W.T.*.	601,589 20	1,277 56	602,866 76
660 00	322,946 03	328,393 08	..Vancouver	324,370 33	4,022 75	328,393 08
140 00	182,844 73	184,173 99	..Victoria	184,010 71	163 28	184,173 99
800 00	505,784 76	512,567 07	....*British Columbia*	508,381 04	4,186 03	512,567 07
34,132 04	9,922,112 14	9,978,373 08	..Totals	9,935,518 82	42,854 26	9,978,373 08
358 00	126,816 13	....	..Less—Refunds as per Statement No. 16.			
33,774 04	9,795,296 01	....	..Net Revenue.			

E. MIALL,
Commissioner.

EXCISE

No. 4.—Collection Divisions

Dr. (*For Details, see*

Balances due by Collectors, July 1, 1899.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for Superannuation.	Insurance.	Retirement	Guarantee.	Balances due to Collectors, June 30, 1900.	Totals.	Divisions.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
43 98	7,085 90	146 36	.....	.....	21 24	....	7,297 48	..Belleville.......... ...
...	8,230 26	165 17	53 82	7 50	25 56	....	8,482 31	..Brantford.... ....
..	1,068 40	20 00	..	...	3 60	....	1,092 00	..Cornwall ....
.....	15,783 94	320 37	.		48 96	....	16,153 27	..Guelph ....
. ...	19,047 36	360 32	...	94 18	70 56	......	19,572 42	..Hamilton ....
... ...	9,376 05	174 26		...	30 96	.....	9,581 27	..Kingston ....
......	18,406 14	334 43	17 94	83 50	53 17	....	18,892 18	..London...... ....
68 45	6,037 15	51 92	.....	142 40	22 92	....	6,322 84	..Ottawa....... ... ..
.. .	5,140 90	77 88	. .	34 13	13 20	....	5,266 11	..Owen Sound. ......
.... .	6,270 18	57 96	....	133 96	28 56	....	6,490 66	..Perth................
... ..	4,368 02	86 22	.....	.....	15 54	....	4,469 78	..Peterborough.. ....
... ...	1,068 75	20 00	..	....	3 60	.. ....	1,092 35	..Port Arthur ....
....	10,907 56	198 82	.....	.....	36 72	....	11,143 10	..Prescott ....
....	4,599 80	99 44	.....	.....	14 40	... .	4,713 64	..St. Catharines..........
... .	6,170 83	106 46	.....	.....	12 82	....	6,290 11	..Stratford ....
... ..	35,578 86	653 36	.....	150 88	107 57	....	36,490 67	..Toronto ....
... ...	19,671 23	370 66	....	30 00	73 08	49 08	20,194 05	..Windsor..... ....
... .	8,168 71	134 08	.....	.....	26 78	....	8,329 57	..District Inspectors.....
112 43	186,977 04	3,377 71	71 76	676 55	669 24	49 08	191,873 81	....*Ontario* . ...
... ..	3,637 14	28 04	.....	79 94	17 40	....	3,762 52	..Joliette..... ....
....	40,419 35	697 19	....	256 46	154 56	....	41,527 56	..Montreal . . ..
....	14,332 49	230 88	....	25 04	47 28	....	14,635 69	..Quebec ....
.. ... .	7,940 52	73 36	.. .	166 23	16 14	....	8,196 25	..Sherbrooke ....
.... . .	1,031 58	20 00	.....	.....	3 60	....	1,055 18	..Sorel ....
.. . .	2,050 40	19 96	.....	45 53	11 72	....	2,127 61	..St. Hyacinthe ... .
. ...	2,089 77	39 00	.....	.....	6 48	....	2,135 25	..Three Rivers..... .....
.... ..	1,424 42	24 52	.....	11 74	4 80	....	1,465 48	..Victoriaville........ ...
....	4,424 44	40 00	...	106 45	17 41	....	4,588 30	..District Inspectors.....
....	77,350 11	1,172 95	. ..	691 39	279 39	....	79,493 84	...*Quebec*..............
.. ...	9,681 60	183 55	.....	......	35 28	.. ..	9,900 43	..St. John............. .
....	3,076 37	50 00	.....	....	9 00	....	3,135 37	..District Inspector. ....
. ..	12,757 97	233 55	.....	.....	44 28	....	13,035 80	...*New Brunswick* ......
... .	11,041 54	213 36	.....	......	35 52	....	11,290 42	..Halifax....... .. .. ..
... .. .	1,822 88	19 96	.....	30 43	6 48	....	1,879 75	..Pictou..... ... .
... .	12,864 42	233 32	.. .	30 43	42 00	....	13,170 17	... *Nova Scotia*..........
100 00	2,253 74	43 96	. .	....	6 48	....	2,404 18	..*Charlottetown* ... .
200 00	13,935 38	201 89	.....	128 64	49 32	....	14,515 23	..Winnipeg, Man........
... .	3,255 23	33 96	....	49 96	12 24	....	3,351 39	..Calgary, N.W.T. ......
......	3,384 50	50 00	.....	......	9 00	....	3,443 50	..District Inspector......
200 00	20,575 11	285 85	..	178 60	70 56	....	21,310 12	....*Manitoba and N.W.T.*

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Appendix B.) Cr.

Balances due to Collectors, July 1, 1899.	Expenditures authorized by the Department.						Balances due by Collectors, June 30, 1900.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
....	6,815 00	1 15	37 26	....	216 60	183 49	43 98	7,297 48
....	7,449 96	9 20	....	50 00	482 03	491 12	....	8,482 31
....	1,000 00	....	....	....	2 50	89 50	....	1,092 00
....	14,907 50	....	....	138 28	513 20	594 29	....	16,153 27
....	19,243 25	....	....	....	93 70	235 47	....	19,572 42
135 00	8,722 50	11 50	....	270 00	71 80	370 47	....	9,581 27
24 09	17,700 66	5 55	445 87	80 00	210 20	425 81	....	18,892 18
....	6,023 43	96 25	....	....	33 75	169 41	....	6,322 84
42 69	4,582 50	....	....	125 00	373 95	141 97	....	5,266 11
....	5,979 96	....	....	120 00	100 80	289 90	....	6,490 66
....	4,316 63	....	....	....	10 85	142 30	....	4,469 78
....	1,000 00	....	....	....	19 45	49 13	23 77	1,092 35
25 55	10,749 89	5 20	100 00	....	5 10	257 36	....	11,143 10
45 82	3,725 00	21 76	499 95	48 00	220 85	152 26	....	4,713 64
33 59	5,329 03	....	....	....	429 90	497 59	....	6,290 11
....	34,714 03	64 29	616 00	....	522 65	573 70	....	36,490 67
49 08	19,209 96	25 19	100 00	....	367 74	442 08	....	20,194 05
....	6,706 43	....	....	161 00	1,118 33	343 81	....	8,329 57
355 82	178,175 73	240 09	1,799 08	992 28	4,793 40	5,449 66	67 75	191,873 81
....	3,600 00	....	....	....	46 15	116 37	....	3,762 52
....	38,481 06	164 40	1,208 14	....	896 70	783 26	....	41,527 56
141 72	11,382 38	122 65	1,986 78	20 00	496 11	486 05	....	14,635 69
....	6,995 00	52 00	....	300 00	539 53	309 72	....	8,196 25
....	1,000 00	29 98	....	....	3 95	21 25	....	1,055 18
24 70	1,913 41	14 55	....	....	118 15	56 80	....	2,127 61
....	1,950 00	5 10	....	....	103 75	76 40	....	2,135 25
88 94	935 17	36 70	264 82	30 00	25 10	84 75	....	1,465 48
21 13	4,338 67	....	....	....	168 93	59 57	....	4,588 30
276 49	70,595 69	425 38	3,459 74	350 00	2,392 37	1,994 17	....	79,493 84
....	9,298 75	....	....	....	380 92	220 76	....	9,900 43
....	2,500 00	....	....	....	618 09	17 28	....	3,135 37
....	11,798 75	....	....	....	999 01	238 04	....	13,035 80
....	10,680 00	112 95	....	....	84 60	412 87	....	11,290 42
....	1,608 65	33 78	....	....	114 85	122 47	....	1,879 75
....	12,288 65	146 73	....	....	199 45	535 34	....	13,170 17
....	2,200 00	....	....	30 00	3 20	70 98	100 00	2,404 18
....	12,443 96	....	730 00	290 00	524 35	326 92	200 00	14,515 23
....	2,500 00	....	....	90 00	555 10	206 29	....	3,351 39
....	2,500 00	....	....	....	851 70	91 80	....	3,443 50
....	17,443 96	....	730 00	380 00	1,931 15	625 01	200 00	21,310 12

EXCISE

No. 4.—Collection Divisions

Dr. (*For Details, see*

Balances due by Collectors, July 1, 1899.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for: Superannuation.	Insurance.	Retirement.	Guarantee	Balances due to Collectors, June 30, 1900.	Totals.	Divisions.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
	10,895 38	30 00		284 13	32 94		11,242 45	Vancouver
	5,142 84	107 23		15 00	20 16		5,285 23	Victoria
	3,489 85	50 00			9 00		3,548 85	District Inspector
	19,528 07	187 23		299 13	62 10		20,076 53	*British Columbia*
	332 41						332 41	Chief Inspector of Inland Revenue
	82 31						82 31	Inspector of Bonded Factories
	1,464 77						1,464 77	General Expenditure
	5,553 54						5,553 54	Legal Expenses
	6,697 05						6,697 05	Printing
	1,039 53						1,039 53	Stationery
	547 00						547 00	Lithographing, Engraving, &c
0 65	11,136 29				0 96		11,137 90	Preventive Service
	5,500 51						5,500 51	Commission to Custom Officers
	63 17						63 17	Commission on sale of Stamps for Canada Twist.
	35,000 00						35,000 00	Tobacco Stamps
	6,299 18						6,299 18	Duty-pay to officers in charge of most important establishments
413 08	406,022 22	5,534 57	71 76	1876 10	1,115 01	49 08	415,081 82	*Grand Totals*

Inland Revenue Department,
Ottawa, September 22, 1900.

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Appendix B.) Cr.

Balances due to Collectors, July 1, 1899.	Expenditures authorized by the Department.						Balances due by Collectors, June 30, 1900.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
114 94	7,186 61	....	1,692 53	774 00	746 78	727 59	....	11,242 45
....	4,415 00	....	480 00	120 00	78 80	191 43	....	5,285 23
....	2,500 00	....	....	....	1,048 85	....	....	3,548 85
114 94	14,101 61	....	2,172 53	894 00	1,874 43	919 02	....	20,076 53
....	....	....	....	....	297 41	35 00	....	332 41
....	....	....	....	....	52 95	29 36	....	82 31
....	....	....	....	....	....	1,464 77	....	1,464 77
....	....	....	....	....	....	5,553 54	....	5,553 54
....	....	....	....	....	....	6,697 05	....	6,697 05
....	....	....	....	....	....	1,039 53	....	1,039 53
....	....	....	....	....	....	547 00	....	547 00
....	2,116 61	....	5,466 11	1,853 97	....	1,701 21	....	11,137 90
....	....	....	....	....	....	5,500 51	....	5,500 51
....	....	....	....	....	....	63 17	....	63 17
....	....	....	....	....	....	35,000 00	....	35,000 00
....	....	....	....	....	....	6,299 18	....	6,299 18
747 25	308,721 00	812 20	13,627 46	4,500 25	12,543 37	73,762 54	367 75	415,081 82

E. MIALL,
Commissioner.

HYDRAULIC AND OTHER RENTS.

No. 5.—Summary Statement of Lessees' Accounts, 1899-1900.

(*For Details, see Appendix A.*)

Dr. | Cr.

Balances due July 1, 1899.	Accrued during the year ended June 30, 1900.	Totals.	—	Abatements.	Deposited to the credit of the Receiver General.	Balances due June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
2,724 84	3,260 00	2,724 84	Chandière Falls and Ottawa River	980 00	3,036 00	1,968 84	5,984 84
25 00	27 00	52 00	St. Lawrence River		2 00	50 00	52 00
120 00	20 00	140 00	St. Maurice River	100 00	20 00	20 00	140 00
70 00		70 00	Rivière du Lièvre			70 00	70 00
486 00	221 00	3,967 00	Sundry properties		155 00	552 00	707 00
			Land Sales.				
15,573 50		15,573 50	Principal Accounts			15,573 50	15,573 50
9,474 83		9,474 83	Interest			9,474 83	9,474 83
28,474 17	3,528 00	32,002 17		1,080 00	3,213 00	27,709 17	32,002 17

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 6.—MINOR PUBLIC WORKS, 1899-1900.

Dr. | Cr.

Balances due July 1, 1899.	Accrued during the year ended June 30, 1900.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due June 30, 1900.	
$ cts	$ cts.	$ cts.	*Bridges.*	$ cts.	$ cts.	$ cts.
2,600 62	....	2,600 62	Dunnville	....	2,600 62	2,600 62
			Ferries.			
75 00	30 44	105 44	Bridgeburg and Black Rock	80 44	25 00	105 44
10 00	10 00	20 00	Bristol	10 00	10 00	20 00
50 00	50 00	100 00	Buckingham and Cumberland	50 00	50 00	100 00
....	250 00	250 00	Buffalo and Point Abinot	250 00	....	250 00
....	10 00	10 00	Cross Point and Campbellton	....	10 00	10 00
20 00	....	20 00	Edmundston and Maine	....	20 00	20 00
....	50 00	50 00	Fort Erie and Buffalo	....	50 00	50 00
....	1 00	1 00	Gould's Landing and Portage du Fort	1 00	....	1 00
155 00	155 00	310 00	Hull (new lease)	155 00	155 00	310 00
1,736 79	....	1,736 79	Hull (old lease)	....	1,736 79	1,736 79
....	30 00	30 00	La Passe and Gower Point	30 00	....	30 00
....	6 00	6 00	Montebello and Alfred	6 00	....	6 00
100 00	50 00	150 00	Niagara and Youngstown	100 00	50 00	150 00
....	2 00	2 00	Ottawa and Kettle Island	....	2 00	2 00
....	1 00	1 00	Ouellette Street, Detroit	1 00	....	1 00
....	10 00	10 00	Papineauville and Brown's wharf	10 00	....	10 00
....	202 00	202 00	Pembroke and Allumette Island (new lease)	202 00	....	202 00
1 00	....	1 00	Pembroke and Allumette Island (old lease)	....	1 00	1 00
....	400 00	400 00	Prescott and Ogdensburg	400 00	....	400 00
10 00	10 00	20 00	Queenston	20 00	....	20 00
....	60 00	60 00	Queenston and Lewiston	60 00	....	60 00
159 00	159 00	318 00	Quyon	159 00	159 00	318 00
....	50 00	50 00	Rockliffe and Gatineau	50 00	....	50 00
....	100 00	100 00	Sault Ste. Marie	100 00	....	100 00
30 00	....	30 00	St. Léonard and Van Buren	....	30 00	30 00
			Sundries.			
8,000 00	....	8,000 00	Dundas and Waterloo Road	....	8,000 00	8,000 00

Dr. No. 6.—MINOR PUBLIC WORKS, 1899-1900—*Concluded.* Cr.

Balances due July 1, 1899.	Accrued during the Year ended June 30, 1900.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	*Sundries*—Concluded.	$ cts.	$ cts.	$ cts.
....	2 00	2 00	Government Telegraph Lines	2 00	....	2 00
....	175 00	175 00	Part of building, Portland, N.B.	175 00	....	175 00
....	25 00	25 00	Wiarton Docks	25 00	....	25 00
12,947 41	1,838 44	14,785 85	Totals	1,886 44	12,899 41	14,785 85

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

No. 7.—CULLERS' REVENUE, 1899-1900.

(*For Details, see Appendix A.*)

DR. CR.

Balances due July 1, 1899.	Amounts accrued for measuring and culling timber during the year ended June 30, 1900.	Totals.	—	Deposited to the credit of the Receiver General.	Balances due June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
37,505 65	8,154 74	45,660 39	Quebec	8,154 74	37,505 65	45,660 39
289 77	....	289 77	Plamondon, M. A.	....	289 77	289 77
37,795 42	8,154 74	45,950 16	Totals	8,154 74	37,795 42	45,950 16

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

No. 8.—CULLERS' EXPENDITURES, 1899–1900

(*For Details, see Appendix B.*)

DR. CR.

Balances due July 1, 1899.	Received from Department to meet expenditure.	Deductions from Salaries for: Superannuation.	Deductions from Salaries for: Retirement.	Totals.	—	Authorized Expenditures: Salaries.	Authorized Expenditures: Contingencies.	Authorized Expenditures: Cullers' Fees.	Authorized Expenditures: Annuities.	Balances due June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
75 00	7,513 36	102 00	37 44	7,727 80	Quebec	5,850 00	1,802 80			75 00	7,727 80
	9,700 00			9,700 00	Superannuated Cullers and Cullers' Fees			4,200 00	5,500 00		9,700 00
	24 20			24 20	Printing		24 20				24 20
	26 10			26 10	Stationery		26 10				26 10
75 00	17,263 66	102 00	37 44	17,478 10	Totals	5,850 00	1,853 10	4,200 00	5,500 00	75 00	17,478 10

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

BILL STAMPS, 1899-1900.

DR. No. 9.—BILL STAMP Distributors in account with the Inland Revenue Department. CR.

Balances, July 1, 1899.		Totals.	—	Balances, June 30, 1900.		Totals.
Stamps on hand.	Cash on hand.			Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,372 77		1,372 77	Post Office Department	1,372 77		1,372 77
	11 54	11 54	Belleville, ex-Collector E. R. Benjamin		11 54	11 54
	33 50	33 50	Three Rivers, ex-Collector B. Lassalle		33 50	33 50
160 00		160 00	McLeod, Colonel J. F., Fort McLeod	160 00		160 00
1,532 77	45 04	1,577 81	Totals	1,532 77	45 04	1,577 81

LAW STAMPS, 1899-1900.

DR. No. 10.—LAW STAMP Distributors in account with the Inland Revenue Department. CR.

Stamps received from Department.	Totals.	—	Commission of 5 per cent allowed by Department on Stamps sold.	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,500 00	1,500 00	Cameron, R., Registrar, Supreme Court	75 00	1,425 00	1,500 00
3,505 00	3,505 00	Audette, L. A., Registrar, Exchequer Court	175 25	3,329 75	3,505 00
5,005 00	5,005 00	Totals	250 25	4,754 75	5,005 00

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

Dr. No. 11.—SUNDRY MINOR REVENUES, 1899–1900. Cr.

Accrued during the year ended June 30, 1900.	Totals.	——	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
362 00	362 00	....Fertilizers Inspection Fees........	362 00	362 00
257 00	257 00	....Adulteration of Food Fees........	257 00	257 00
24 51	24 51	....Casual Revenue....................	24 51	24 51
643 51	643 51		643 51	643 51
3 00	3 00	.. Less Refund as per Statement No. 16........	3 00	3 00
640 51	640 51		640 51	640 51

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 12.—SUNDRY MINOR EXPENDITURES, 1899–1900.

(*For Details, see Appendix B.*)

Dr. | Cr.

Balance due July 1, 1899.	Amounts received from Department to meet Expenditure	Deductions from Salaries for Superannuation.	Balance due to Inspector, June 30, 1900.	Totals.	—	Salaries.	Contingencies.	Printing.	Stationery	Balance due June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
25 81	24,467 14	109 96	....	24,602 91	....Adulteration of Food. ..	9,765 93	13,900 10	593 62	117 45	225 81	24,602 91
....	7,168 93	....	21 94	7,190 87	...Inspection of Staples.	1,500 00	5,676 57	14 30	....	....	7,190 87
.... .	27 50	....	....	27 50	....Minor Public Works.	.... ..	15 00	12 50	... .	....	27 50
25 81	31,663 57	109 96	21 94	31,821 28	....Totals....	11,265 93	19,591 67	620 42	117 45	225 81	31,821 28

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 13.—STATEMENT showing the quantities of the several articles subject to
1898, 1899 and 1900, and

Articles Subject to Excise Duty.	1898. Quantities. Ex-Manufactory.	Ex-Warehouse.	Totals.	Duty.
	Gallons.	Gallons.	Gallons.	$ cts.
Spirits	3,866	1,874,479	1,878,345	3,563,575 92
	Imported.	94,681	94,681	28,404 39
	3,866	1,969,160	1,973,026	3,591,980 31
Malt Liquor, the duty being paid on malt.	19,871,738		19,871,738	101 00
	Lbs.	Lbs.	Lbs.	
Malt	1,934,547	37,020,168	38,954,715	584,321 14
Cigars—	No.	No.	No.	
Foreign	67,872,123	44,520,190	112,392,313	674,357 61
Canadian	413,160	291,750	704,910	2,114 73
Combination	35,000		35,000	105 00
Totals	68,320,283	44,811,940	113,132,223	676,577 34
Cigarettes—				
Foreign	79,046,817	619,500	79,666,317	238,998 95
Canadian	411,000	485,500	896,500	1,344 75
Combination				
Totals	79,457,817	1,105,000	80,562,817	240,343 70
	Lbs.	Lbs.	Lbs.	
Tobacco from Foreign Leaf	821,324	5,827,009	6,648,333	1,662,070 10
" Canadian Leaf	1,630,737	257,222	1,887,959	94,398 03
" Combination Leaf				
Snuff	223,175		223,175	40,610 37
Canadian Twist		55,379	55,379	2,768 96
Totals	2,675,236	6,139,610	8,814,846	2,040,191 16
Raw Leaf Tobacco, Foreign		8,506,199	8,506,199	851,786 25
Total Duties on Tobacco and Cigarettes				2,891,977 41
Inspection Fees on Petroleum				44,648 15
Vinegar and Acetic Acid				35,176 96
Licenses, Spirits				2,000 00
" Malt Liquor				6,750 00
" Malt				5,575 00
" Cigars				12,220 00
" Tobacco				2,308 00
" Vinegar and Acetic Acid				1,800 00
" Petroleum				
Totals				7,855,435 31

* Spirits imported for use in the manufacture of crude fulminate on which duty, at the rate of 30

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

Excise Duty taken for Consumption, during the years ended June 30, the Duty accrued thereon.

1899.				1900.			
Quantities.			Duty.	Quantities.			Duty.
Ex-Manufactory.	Ex-Warehouse.	Totals.		Ex-Manufactory.	Ex-Warehouse.	Totals.	
Gallons.	Gallons.	Gallons.	$ cts.	Gallons.	Gallons.	Gallons.	$ cts.
5,571	2,404,599	2,410,170	4,566,147 06	493	2,523,576	2,524,069	4,778,352 20
Imported.	*137,825	137,825	41,347 41	Imported.	134,969	134,969	40,490 72
5,571	2,542,424	2,547,995	4,607,494 47	493	2,658,545	2,659,038	4,818,842 92
21,101,873	...	21,101,873	57 00	23,309,172	...	23,309,172	498 90
Lbs. 19,121	Lbs. 46,193,701	Lbs. 46,212,822	843,193 34	Lbs. ...	Lbs. 60,284,064	Lbs. 60,284,064	904,262 81
No.	No.	No.		No.	No.	No.	
71,664,873	55,577,730	127,242,603	763,467 25	70,693,362	61,799,185	132,492,547	794,965 41
775,750	245,900	1,021,650	3,064 95	1,256,590	429,550	1,686,140	5,058 42
524,845	130,000	654,845	1,964 54	2,534,520	1,328,500	3,863,020	11,589 06
72,965,468	55,953,630	128,919,098	768,496 74	74,484,472	63,557,235	138,041,707	811,612 89
100,609,828	141,000	100,750,828	302,252 49	113,256,372	2,184,050	115,440,422	346,321 26
...	392,500	392,500	588 75	349,000	200,000	549,000	823 50
...	...	...	...	72,100	...	72,100	108 15
100,609,828	533,500	101,143,328	302,841 24	113,677,472	2,384,050	116,061,522	347,252 91
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
719,987	6,385,800	7,105,787	1,776,457 27	644,818	6,303,787	6,948,605	1,737,151 40
1,564,167	622,260	2,186,427	109,321 37	1,782,442	680,933	2,463,375	123,168 86
263,906	88,299	352,205	17,610 28	528,327	597,896	1,126,223	56,311 26
218,225	...	218,225	39,700 85	219,337	400	219,737	40,031 25
...	84,115	84,115	4,205 76	...	58,914	58,914	2,945 70
2,766,285	7,180,474	9,946,759	2,250,136 77	3,174,924	7,641,930	10,816,854	2,306,861 38
...	10,239,863	10,239,863	1,667,656 40	...	9,352,535	9,352,535	971,977 60
...	...	...	3,317,793 17	...	...	...	3,278,838 98
...	...	...	46,059 81	...	...	...	5,502 71
...	...	...	47,572 32	...	...	...	37,739 21
...	...	...	2,125 00	...	...	...	2,375 00
...	...	...	6,750 00	...	...	...	6,675 00
...	...	...	6,275 00	...	...	...	6,275 00
...	...	...	12,822 50	...	...	...	14,030 00
...	...	...	2,375 00	...	...	...	2,800 50
...	...	...	2,000 00	...	...	...	2,100 00
...	...	...	...	...	...	...	2 00
...	...	...	9,663,014 35	...	...	...	9,891,555 92

cents per gallon, was collected and afterwards refunded, on the exportation of the fulminate.

E. MIALL,
Commissioner.

No. 14.—AMOUNTS deposited monthly to the credit of the Honourable the Receiver General on account of Inland Revenues, during the Fiscal Year ended June 30, 1900.

——	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North west Territories.	British Columbia.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
JULY :								
Excise	275,074 45	291,882 01	17,438 80	16,080 91	2,937 05	45,594 17	40,801 10	689,808 55
" Seizures	105 00	127 15	5 00	135 00				372 15
Culling Timber		1,118 96						1,118 96
Hydraulic Rents	50 00	1 00					25 00	76 00
Minor Public Works		5 00						5 00
Weights and Measures	1,307 47	1,391 16		58 65	7 65			2,764 93
Gas Inspection	1,057 75	38 00		106 75			27 50	1,230 00
Electric Light Inspection	113 00			12 75			48 00	173 75
Other Revenues	1,667 50	285 00		165 00	3 00	190 00	25 00	2,335 50
Totals	279,375 17	294,848 31	17,443 80	16,559 09	2,947 70	45,784 17	40,926 60	697,884 84
AUGUST :—								
Excise	310,523 02	305,865 49	19,664 56	15,991 54	2,733 37	17,105 52	47,233 23	749,116 73
" Seizures	80 00	325 80						405 80
Culling Timber		853 62						853 62
Minor Public Works	200 00							200 00
Weights and Measures	1,992 60	2,501 85	328 45	200 20	78 60	490 10	104 65	5,696 45
Gas Inspection	757 50	368 50	11 25	68 00	9 50	19 50		1,234 25
Electric Light Inspection	126 00	327 75	31 50	11 75		42 00	70 25	609 25
Other Revenues	1,012 65	360 00	200 00	100 00	25 00	25 00	174 00	1,896 65
Totals	314,691 77	310,603 01	20,235 76	16,371 49	2,846 47	47,682 12	47,582 13	760,012 75
SEPTEMBER :—								
Excise	350,495 13	394,968 50	21,882 76	18,142 68	4,125 13	54,923 44	17,384 28	891,921 92
" Seizures	175 00	188 10		169 50		5 31		537 91
Culling Timber		1,179 18						1,179 18
Hydraulic Rents		20 00					25 00	45 00
Minor Public Works	80 44		43 75					124 19
Weights and Measures	2,383 61	2,193 23	207 25	161 51	44 46	820 20	16 20	5,829 46
" " Seizures		5 00						5 00
Gas Inspection	1,038 75	281 25	7 00	24 50	5 00	22 50	34 00	1,413 00
Electric Light Inspection	297 00	198 00	29 25	14 25			46 25	584 75
Other Revenues	755 50	44 00		85 00	3 00	14 00	35 00	936 50
Totals	355,225 43	399,077 26	22,170 01	18,600 44	4,177 59	55,785 45	47,540 73	902,576 91

October :—								
Excise	364,050 05	384,974 98	22,664 68	18,871 97	4,948 65	60,394 73	43,642 59	899,547 65
" Seizures	200 00	362 80		209 00		3 75	72 15	838 70
Culling Timber		278 99						278 99
Weights and Measures	3,497 79	1,551 34	266 05	211 58	100 12	696 55	19 25	6,342 68
Gas Inspection	1,126 00	644 00	51 00	55 50	1 50	27 00	36 75	1,941 75
Electric Light Inspection	196 00	347 75	16 75	21 75		11 25	69 50	663 00
Other Revenues	460 05	5 00						465 05
Totals	369,529 89	388,164 86	22,998 48	19,360 80	5,050 27	61,133 28	43,840 24	910,077 82
November :—								
Excise	382,376 95	392,653 90	20,470 27	20,296 18	5,931 70	58,148 35	45,626 39	925,503 74
" Seizures	220 30	426 66	5 00					651 96
Culling Timber		33 33						33 33
Hydraulic Rents	201 00	1 00	5 00				6 00	213 00
Minor Public Works	271 00		43 75					314 75
Weights and Measures	1,767 52	1,055 85	72 75	142 96	19 73	513 14	226 40	3,798 35
" " Seizures		10 00						10 00
Gas Inspection	1,125 50	580 50	25 00	36 75		42 00	29 75	1,839 50
Electric Light Inspection	200 50	262 75		29 25		19 25	112 00	623 75
" " Penalties	50 00							50 00
Other Revenues	397 50	5 00		10 00	25 00			437 50
Totals	386,610 27	395,028 99	20,621 77	20,515 14	5,976 43	58,722 74	46,000 54	933,475 88
December :—								
Excise	368,705 88	422,841 16	20,728 45	25,475 63	4,325 79	59,321 38	39,046 36	940,444 65
" Seizures	146 52	263 27						409 79
Culling Timber		876 54						876 54
Hydraulic Rents	300 00						17 00	317 00
Minor Public Works							1 00	1 00
Weights and Measures	2,355 11	635 07	123 30	286 05	12 25	406 60	13 00	3,831 38
Gas Inspection	1,140 25	537 75	10 00	14 25	8 00	37 25	56 00	1,803 50
Electric Light Inspection	358 75	595 00	75 25	29 50		139 25	55 50	1,253 25
Other Revenues	237 50				10 00		6 00	253 50
Totals	373,244 01	425,748 79	20,937 00	25,805 43	4,356 04	59,904 48	39,194 86	949,190 61
January :—								
Excise	311,780 78	331,419 90	19,050 77	16,917 50	4,688 95	40,887 39	39,380 99	764,126 28
" Seizures	81 04	218 57	8 40	84 06				392 07
Culling Timber		204 69						204 69
Hydraulic Rents	1 00			1 00				2 00
Minor Public Works	25 00	159 00						184 00
Weights and Measures	3,943 72	428 48	42 10	67 60	9 65	389 35	37 50	4,909 40
Gas Inspection	1,299 25	492 00	106 25	93 00	18 00	33 25	67 50	2,109 25
Electric Light Inspection	257 75	379 75	36 50	11 00		283 00	117 50	1,085 50
Other Revenues	290 50	10 00	1 00					301 50
Totals	317,679 04	333,312 39	19,245 02	17,174 16	4,716 60	41,583 99	39,603 49	773,314 69

No. 14.—AMOUNTS deposited monthly to the credit of the Honourable the Receiver General, &c.—*Concluded.*

—	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North-west Territories.	British Columbia.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
FEBRUARY :								
Excise	278,430 72	331,051 58	15,500 27	16,717 50	3,731 24	37,635 65	33,264 20	716,331 16
" Seizures	10 00	217 50						227 50
Culling Timber		149 10						149 10
Hydraulic Rents	400 00							400 00
Weights and Measures	1,675 24	668 30	79 90	29 70	15 45	264 40	50 00	2,782 99
Gas Inspection	839 00	380 50	16 50		6 00	19 50	161 25	1,422 75
" Seizures	5 00							5 00
Electric Light Inspection	421 75	339 50	29 50	27 50		161 75	81 25	1,067 25
Other Revenues	629 45	98 00	19 00		9 00	17 00		772 45
Totals	282,414 16	332,904 48	15,645 17	16,774 70	3,761 69	38,101 30	33,556 70	723,158 20
MARCH :								
Excise	433,510 00	331,835 40	19,301 54	19,999 43	5,791 16	70,428 88	59,485 94	940,352 35
" Seizures	103 00	588 53				44 50		736 03
Hydraulic Rents	151 00	25 00						176 00
Minor Public Works	156 00		43 75					199 75
Weights and Measures	1,662 09	761 60	31 75	85 76	12 20	131 45	9 45	2,694 30
" " Seizures						50 00		50 00
Gas Inspection	1,103 25	190 25	11 00	12 25		65 00	14 50	1,426 25
Electric Light Inspection	308 75	217 25	20 50			118 50	68 00	733 00
Other Revenues	616 00	15 50	13 00	15 00		12 00		671 50
Totals	437,610 09	333,633 53	19,421 54	20,142 44	5,803 36	70,850 33	59,577 89	947,039 18
APRIL :								
Excise	298,969 22	346,907 76	19,176 45	18,783 54	4,199 95	28,400 79	29,839 22	746,276 93
" Seizures	50 00	102 75						152 75
Culling Timber		108 17						108 17
Hydraulic Rents	1,300 00	1 00			1 00		1 00	1,303 00
Minor Public Works	10 00	56 00						66 00
Weights and Measures	2,858 96	1,115 25	22 40	110 05	12 68	88 10	175 85	4,383 29
" " Seizures						1 50		1 50
Gas Inspection	1,195 25	571 25	19 00	38 00		76 75	46 25	1,946 50
Electric Light Inspection	204 75	155 50	25 50			28 50	106 50	520 75
Other Revenues	574 36		6 00	12 00			23 00	615 36
Totals	305,162 54	349,017 68	19,249 35	18,943 59	4,213 63	28,595 64	30,191 82	755,374 25

MAY :—								
Excise	331,924 15	363,230 90	19,984 29	20,260 71	4,888 63	44,007 43	36,167 78	820,463 89
" Seizures	45 40	366 28						411 68
Culling Timber		728 85						728 85
Hydraulic Rents	101 00			16 00			51 00	168 00
Minor Public Works	613 00	85 00	43 75					741 75
Weights and Measures	2,157 54	1,920 58	66 27	159 54	8 11	246 95	10 10	4,569 09
" " Seizures	20 00							20 00
Gas Inspection	979 00	424 00	15 00	51 50		49 25	40 75	1,559 50
Electric Light Inspection	256 75	243 75	4 00	31 00		81 00	56 25	672 75
Other Revenues	560 75		1 00	1 00				562 75
Totals	336,657 59	366,999 36	20,114 31	20,519 75	4,896 74	44,384 63	36,325 88	829,898 26
JUNE :—								
Excise	350,095 33	346,602 02	23,097 87	19,371 49	5,257 40	54,687 91	46,436 81	845,548 83
" Seizures	412 85	426 95		100 00				939 80
Culling Timber		2,623 31						2,623 31
Hydraulic Rents	511 00	2 00						513 00
Minor Public Works	50 00							50 00
Weights and Measures	3,091 31	2,033 03	244 71	273 66	83 64	65 07	129 80	5,921 22
" " Seizures	15 00	10 00						25 00
Gas Inspection	2,006 00	925 25	49 25	22 50	18 00	103 75	30 75	3,155 50
" Seizures	20 00							20 00
Electric Light Inspection	359 00	856 25	14 25	125 25		292 25	140 25	1,787 25
Other Revenues	715 50			4 00			23 00	742 50
Totals	357,275 99	353,478 81	23,406 08	19,896 90	5,359 04	55,148 98	46,760 61	861,326 41
Totals for the year	4,115,475 95	4,282,817 47	241,488 29	230,663 93	54,105 56	607,677 11	511,101 49	10,043,329 80
Methylated Spirits								64,964 80
Grand Total								10,108,294 60

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

EXCISE

No. 15.—COMPARATIVE Monthly

—		July.	August.	September.	October.	November.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Spirits	1898-99	317,872 73	368,708 45	388,014 13	438,321 34	435,554 71
	1899-1900	326,550 12	372,100 70	428,091 37	459,315 58	449,707 03
Increase, 1899-1900		8,677 36	3,392 25	40,077 24	20,994 24	14,152 32
Decrease, 1899-1900						
Malt Liquor	1898-99	6,200 00	100 00	100 00	50 00	
	1899-1900	6,100 00	50 00	60 00	250 00	266 40
Increase, 1899-1900					200 00	266 40
Decrease, 1899-1900		100 00	50 00	40 00		
Malt	1898-99	46,419 74	54.754 28	65.639 29	67,458 20	77.966 51
	1899-1900	52,527 77	59.702 91	67,879 91	77,437 07	83,490 61
Increase, 1899-1900		6.108 03	4,948 63	2.240 62	9,978 87	5.524 10
Decrease, 1899-1900						
Tobacco	1898-99	260,941 98	293,499 82	283,377 23	296,713 48	289,356 12
	1899-1900	247,259 05	253,987 06	310,946 07	320,103 90	315.955 10
Increase, 1899-1900				27,568 84	23,390 42	26,598 98
Decrease, 1899-1900		13,682 93	39,512 76			
Cigars	1898-99	74,880 40	68,775 47	66.915 06	69.627 74	62,732 64
	1899-1900	80.504 35	73,254 60	68,620 39	69,108 99	70,033 64
Increase, 1899-1900		5,623 95	4,479 13	1,705 33		7,301 00
Decrease, 1899-1900					518 75	
Petroleum	1898-99	2,178 55	3,397 35	5,293 47	6.223 86	5,942 77
	1899-1900	2.103 15	3,109 66	235 70	40 00	
Increase, 1899-1900						
Decrease, 1899-1900		75 40	287 69	5,057 77	6,183 86	5,942 77
Manufactures in bond.	1898-99	3,656 14	2,399 83	2,959 35	4,063 17	3,036 95
	1899-1900	2,469 76	2.933 59	3,499 38	3,710 99	2,518 41
Increase, 1899-1900			533 76	540 03		
Decrease, 1899-1900		1,186 38			352 18	518 54
Seizures	1898-99	571 05	750 62	723 94	316 38	835 96
	1899-1900	367 15	409 74	622 67	770 30	633 46
Increase, 1899-1900					453 92	
Decrease, 1899-1900		203 90	340 88	101 27		202 50
Other receipts	1898-99	6,999 17	9,919 52	5,379 70	2.189 35	1,525 13
	1899-1900	12.101 93	1,563 27	1,670 37	1,460 95	1,736 77
Increase, 1899-1900		5,102 76				211 64
Decrease, 1899-1900			8,356 25	3,709 33	728 40	
Total Increase, 1899-1900		10,263 49		63.223 69	47,234 26	47,390 63
Total Decrease, 1899-1900			35,193 81			
Total Revenue, 1898-99		719,719 79	802,305 34	818,402 17	884.963 52	876,950 79
" 1899-1900		729,983 28	767,111 53	881,625 86	932,197 78	924,341 42

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

SESSIONAL PAPER No. 12

REVENUE.

Statement, 1898–99 and 1899–1900.

December.	January.	February.	March.	April.	May.	June.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
527,502 89	362,923 27	347,630 41	332,929 47	382,527 17	361,841 23	345,793 64	4,609,619 47
542,297 33	372,916 64	348,828 31	463,875 40	338,130 49	365,080 72	354,324 23	4,821,217 92
14,794 44	9,993 37	1,197 90	130,945 93	....	3,239 49	8,530 59	211,598 45
....	....	....	....	44,396 68	....	....	....
100 00	75 00	107 00	75 00	....	....	....	6,807 00
50 00	105 00	189 50	....	25 00	....	78 00	7,173 90
....	30 00	82 50	....	25 00	....	78 00	366 90
50 00	....	....	75 00	....	....	....	....
65,623 13	61,962 47	64,701 56	77,740 16	119,956 65	87,647 29	59,599 06	849,468 34
77,223 23	73,611 86	69,919 05	119,673 31	69,597 98	75,695 08	83,779 03	910,537 81
11,600 10	11,649 39	5,217 49	41,933 15	....	....	24,179 97	61,069 47
....	....	....	....	50,358 67	11,952 21	....	....
241,662 22	231,032 27	258,127 09	274,472 91	280,675 61	327,620 64	282,688 80	3,320,168 17
227,361 81	252,094 91	236,653 67	277,312 79	290,106 14	298,852 07	251,006 91	3,281,639 48
....	21,062 64	....	2,839 88	9,430 53	....	....	....
14,300 41	....	21,473 42	....	....	28,768 57	31,681 89	38,528 69
63,336 57	50,997 71	56,703 42	59,428 92	62,804 34	71,852 41	73,264 56	781,319 24
70,461 05	55,527 62	57,080 64	62,392 06	64,958 94	76,772 50	76,928 11	825,642 89
7,124 48	4,529 91	377 22	2,963 14	2,154 60	4,920 09	3,663 55	44,323 65
....	....	....	....	....	....	....	....
5,098 02	4,074 17	3,299 01	3,309 71	2,399 69	2,428 46	2,414 75	46,059 81
....	....	....	....	16 20	....	....	5,504 71
....	....	....	....	....	....	....	....
5,098 02	4,074 17	3,299 01	3,309 71	2,383 49	2,428 46	2,414 75	40,555 10
2,350 84	1,837 14	2,038 22	2,754 01	2,230 72	3,324 15	2,843 89	33,494 41
3,054 98	829 05	859 39	1,989 32	2,187 61	2,910 72	3,229 05	30,192 25
704 14	....	....	....	....	....	385 16	....
....	1,008 09	1,178 83	764 69	43 11	413 43	....	3,302 16
454 30	206 18	947 36	731 12	1,202 75	1,743 90	2,229 56	10,713 12
445 56	460 45	251 00	609 33	173 86	487 82	839 80	6,071 14
....	254 27	....	....	....	....	....	....
8 74	....	696 36	121 79	28 89	1,256 08	1,389 76	4,641 98
1,479 42	1,249 40	1,547 84	3,087 49	859 49	3,953 49	2,078 74	40,268 74
2,969 28	4,281 79	1,621 62	918 25	759 00	2,903 13	2,145 68	34,132 04
1,489 86	3,032 39	73 78	....	....	....	66 94	....
....	....	....	2,169 24	100 49	1,050 36	....	6,136 70
16,255 85	45,469 71	....	172,241 67	....	....	1,417 81	224,193 84
....	....	19,698 73	....	86,701 20	37,709 53	....	....
907,607 39	714,357 61	735,101 91	754,528 79	852,656 42	860,411 57	770,913 00	9,697,918 30
923,863 24	759,827 32	715,403 18	926,770 46	765,955 22	822,702 04	772,330 81	9,922,112 14

E. MIALL,
Commissioner.

No. 16.—Refunds of Revenue during the Fiscal Year ended June 30, 1900.

EXCISE.

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1899.			$ cts.	$ cts.
Spirits	Swift, E. G.	July 29	Windsor	Refunded under Revised Statutes, cap. 34, sec. 238	101 78	
	"	Aug. 21	"	" " 34 " 238	295 37	
	"	" 22	"	" " 34 " 238	220 08	
	"	" 29	"	" " 34 " 238	8 08	
	"	Sept. 25	"	" " 34 " 238	239 38	
	"	" 29	"	" " 34 " 238	133 68	
	"	Oct. 5	"	" " 34 " 238	415 30	
	Hamilton, J. S., & Co.	" 21	Brantford	" " 34 " 238	39 28	
	Swift, E. G.	" 21	Windsor	" " 34 " 238	156 59	
	Heney, J. J.	" 27	Prescott	" " 34 " 238	11,702 24	
	Swift, E. G.	Nov. 14	Windsor	" " 34 " 238	433 37	
	Bolmer, J. E.	" 16	"	" " 34 " 238	671 67	
	Swift, E. G.	Dec. 5	"	" " 34 " 238	385 76	
	"	" 16	"	" " 34 " 238	93 44	
		1900.				
	"	Jan. 3	"	" " 34 " 238	201 19	
	"	" 5	"	" " 34 " 238	255 24	
	"	" 16	"	" " 34 " 238	286 01	
	"	Feb. 9	"	" " 34 " 238	195 85	
	"	" 19	"	" " 34 " 238	280 70	
	"	" 24	"	" " 34 " 238	43 64	
	"	Mar. 6	"	" " 34 " 238	52 69	
	"	" 10	"	" " 34 " 238	132 60	
	"	" 20	"	" " 34 " 238	23 29	
	"	" 29	"	" " 34 " 238	339 09	
	"	April 6	"	" " 34 " 238	123 65	
	"	" 21	"	" " 34 " 238	127 81	
	"	" 23	"	" " 34 " 238	168 18	
	Heney, J. J.	" 30	Prescott	" " 34 " 238	11,492 52	
	Howard, A. L.	" 30	Sherbrooke	" " 34 " 238	4,945 76	
	Swift, E. G.	May 3	Windsor	" " 34 " 238	26 77	
	"	" 11	"	" " 34 " 238	257 92	
	Heney, J. J.	" 12	Prescott	" " 34 " 238	11,678 53	
	Swift, E. G.	" 17	Windsor	" " 34 " 238	22 93	

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	"	"	23	"	"	"	34 " 238	372 78	
	"	"	27	"	"	"	34 " 238	27 82	
	"	June	7	"	"	"	34 " 238	227 86	
	"	"	18	"	"	"	34 " 238	164 31	
	Gooderham, W. G	"	27	Toronto	"	"	29 " 78	36 29	
	Swift, E. G	"	28	Windsor	"	"	34 " 238	18 62	
	"	July	6	"	"	"	34 " 238	247 78	
	"	"	12	"	"	"	34 " 238	44 69	
									46,690 54
		1899.							
Malt	Lottridge, J. M	Aug.	17	Hamilton	"	"	29 " 78	700 35	
	Steele, J. J	"	17	"	"	"	29 " 78	649 50	
	Wilson, W. S	"	17	Toronto	"	"	29 " 78	2,092 29	
	Clarke, L. H	"	17	Kingston	"	"	29 " 78	1,883 36	
	Fisher, John	"	17	"	"	"	29 " 78	156 38	
	Stevenson, Tho	"	17	"	"	"	29 " 78	98 13	
	Scott, J. P	"	17	Montreal	"	"	29 " 78	955 41	
	Dawes, A. J	"	17	"	"	"	29 " 78	2,024 46	
	Reinhardt, C. S.	"	17	"	"	"	29 " 78	454 75	
	Molson, H. M	"	17	"	"	"	29 " 78	504 78	
	Star Brewing Co	"	17	"	"	"	29 " 78	47 79	
	Boswell & Bros	"	17	Quebec	"	"	29 " 78	1,141 61	
	Proteau & Carignan	"	17	"	"	"	29 " 78	206 48	
	Ochsner, R	"	17	Calgary	"	"	29 " 78	36 00	
	Kelly & Omand	"	17	"	"	"	29 " 78	13 65	
	Wickwire, W. N	"	17	Halifax	"	"	29 " 78	876 75	
	Oland, John C	"	17	"	"	"	29 " 78	491 87	
	Sleeman, Geo	"	22	Guelph	"	"	29 " 78	333 89	
	Roy, J. A	"	23	Belleville	"	"	29 " 78	204 40	
	Bixel, H	"	23	Brantford	"	"	29 " 78	327 94	
	Luke, C	"	23	"	"	"	29 " 78	104 08	
	Otterbein, C	"	23	"	"	"	29 " 78	109 60	
	Winfindale, A. H	"	23	Ottawa	"	"	29 " 78	24 41	
	Ottawa Brewing and Malting Co	"	23	"	"	"	29 " 78	120 63	
	Schwartz, John S	"	23	Owen Sound	"	"	29 " 78	100 53	
	Farquharson & Grainger	"	23	Windsor	"	"	29 " 78	94 20	
	Shwan, W	"	23	Owen Sound	"	"	29 " 78	10 05	
	Eaton, C	"	23	"	"	"	29 " 78	322 44	
	Schwan David	"	23	"	"	"	29 " 78	43 50	
	Healey, Owen	"	23	Peterborough	"	"	29 " 78	34 41	
	Woodhouse, J. A	"	23	"	"	"	29 " 78	252 48	
	Calcutt, H	"	23	"	"	"	29 " 78	215 34	
	Bowie, Robert	"	23	Prescott	"	"	29 " 78	271 80	
	Prescott Brewing and Malting Co	"	23	"	"	"	29 " 78	281 43	
	Wiser, J. P	"	23	"	"	"	29 " 78	136 33	
	McCarthy, D. J	"	23	"	"	"	29 " 78	560 98	

No. 16.—Refunds of Revenue—*Continued*.

EXCISE—*Continued*.

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1899.			$ cts.	$ cts.
Malt—*Continued*..	Huether, W.	Aug. 23..	Owen Sound	Refunded under Revised Statutes, cap. 29, sec. 78..	115 59	
	Cronmiller & White	〃 23..	St. Catharines	〃 〃 29 〃 78	188 10	
	Taylor, H. J	〃 23..	〃	〃 〃 29 〃 78	460 30	
	Martini, Jos	〃 23..	Stratford	〃 〃 29 〃 78	43 57	
	Watson, John	〃 23..	〃	〃 〃 29 〃 78	97 72	
	Devlin, F	〃 23..	〃	〃 〃 29 〃 78	66 09	
	Clarke, L. H	〃 23..	〃	〃 〃 29 〃 78	1,692 69	
	Kuntz, Jacob	〃 23..	〃	〃 〃 29 〃 78	64 12	
	Griesinger, L.	〃 23..	Windsor	〃 〃 29 〃 78	359 64	
	Hiram Walker & Sons	〃 23..	〃	〃 〃 29 〃 78	1,113 01	
	Roy, J.	〃 23..	Joliette	〃 〃 29 〃 78	18 90	
	Bauer, A.	〃 24..	Guelph	〃 〃 29 〃 78	584 77	
	Sleeman, G.	〃 24..	〃	〃 〃 29 〃 78	1,811 74	
	Bernhardt, P.	〃 24..	〃	〃 〃 29 〃 78	164 04	
	Huether, C. N	〃 24..	〃	〃 〃 29 〃 78	325 25	
	Holliday, T.	〃 24..	〃	〃 〃 29 〃 78	232 28	
	Rau, Mary	〃 25..	〃	〃 〃 29 〃 78	206 82	
	Lutz, W. H	〃 25..	〃	〃 〃 29 〃 78	79 86	
	Seagram, Jos. E.	〃 25..	〃	〃 〃 29 〃 78	117 00	
	Labatt, John	〃 25..	London	〃 〃 29 〃 78	1,035 01	
	Rudolph, Henry	〃 25..	〃	〃 〃 29 〃 78	22 69	
	Carling, T. H.	〃 25..	〃	〃 〃 29 〃 78	1,637 47	
	O'Dwyer, P.	〃 25..	〃	〃 〃 29 〃 78	216 00	
	Amyot & Gauvin	〃 25..	Quebec	〃 〃 29 〃 78	564 00	
	Nutter, S. C.	〃 25..	Sherbrooke	〃 〃 29 〃 78	390 50	
	Ready, James.	〃 25..	St. John, N.B.	〃 〃 29 〃 78	581 66	
	Curren, A. E.	〃 25..	Halifax	〃 〃 29 〃 78	84 07	
	May, John P.	〃 25..	〃	〃 〃 29 〃 78	132 75	
	Oland, J. C.	〃 25..	Charlottetown	〃 〃 29 〃 78	105 30	
	〃	〃 25..	〃	〃 〃 29 〃 78	27 00	
	Cairns, Mary J.	〃 25..	Calgary	〃 〃 29 〃 78	2 85	
	Cross, A. E.	〃 25..	〃	〃 〃 29 〃 78	281 27	
	Woodman, C.	〃 25..	Winnipeg	〃 〃 29 〃 78	6 42	
	Drewry, E. L.	〃 25..	〃	〃 〃 29 〃 78	665 00	
	Witteman, K.	〃 25..	〃	〃 〃 29 〃 78	32 81	
	Blackwood, N.	〃 25..	〃	〃 〃 29 〃 78	112 76	

Kingdon, A.	"	25	"	"	"	29	" 78	60 20
Shea, P.	"	25	"	"	"	29	" 78	244 57
Victoria Phœnix Brewing Co., Ltd	"	25	"	"	"	29	" 78	547 50
Union Brewing Co.	"	25	Victoria	"	"	29	" 78	177 00
Thomas, W. J	"	25	Toronto	"	"	29	" 78	1,193 51
Cosgrove, L. J	"	25	"	"	"	29	" 78	919 64
Davis, R.	"	25	"	"	"	29	" 78	2,421 55
Simpson, T. W.	"	25	"	"	"	29	" 78	108 04
Orillia Brewing Co.	"	25	"	"	"	29	" 78	55 97
Gooderham, W. G.	"	25	"	"	"	29	" 78	830 17
Anderton, J. W.	"	25	"	"	"	29	" 78	92 55
Brain, Edwin	"	25	"	"	"	29	" 78	144 52
O'Keefe, Eugène	"	25	"	"	"	29	" 78	1,454 03
Reinhardt, L.	"	25	"	"	"	29	" 78	1,215 00
Toronto Brewing and Malting Co.	"	25	"	"	"	29	" 78	752 85
Benoit, R. J	"	25	Sherbrooke	"	"	29	" 78	16 20
Wilson, W.	Sept.	19	Toronto	"	"	34	" 178	155 88
Beauport Brewing Co.	Oct.	4	Quebec	"	"	29	" 78	970 08
Walkerville Brewing Co., Ltd	"	4	Windsor	"	"	34	" 178	16 54
Oland, J. C.	"	4	Halifax	"	"	34	" 238	115 16
Wickwire, W. N.	"	4	"	"	"	34	" 238	1,619 60
Victoria Phœnix Brewing Co., Ltd	"	4	Victoria	"	"	34	" 238	219 36
Wilson, W.	"	12	Toronto	"	"	34	" 238	358 56
Winfindale, A. H.	"	24	Montreal	"	"	29	" 78	120 89
Beauport Brewing Co.	"	24	Quebec	"	"	29	" 78	61 34
Roy, J.	Nov.	10	Joliette	"	"	29	" 78	11 67
The Lion Brewing Co., Ltd.	Dec.	19	Vancouver	"	"	29	" 78	18 00
Huether, C. N.	"	19	Guelph	"	"	29	" 78	50 00
Barton, F.	"	19	Montreal	"	"	29	" 78	28 66
	1900.							
Walkerville Brewing Co., Ltd	Jan.	5	Windsor	"	"	34	" 178	24 39
Oland, J. C.	"	5	Halifax	"	"	34	" 238	31 92
May, J. P.	"	5	"	"	"	34	" 238	68 33
Wickwire, W. N.	"	5	"	"	"	34	" 238	1,404 77
Victoria Phœnix Brewing Co., Ltd	"	5	Victoria	"	"	34	" 238	438 12
Wilson, W.	"	13	Toronto	"	"	34	" 270	216 58
Sleeman, G.	"	29	Guelph	"	"	29	" 78	152 61
Beauport Brewing Co.	Mar.	29	Quebec	"	"	29	" 78	52 47
The Lion Brewing Co., Ltd.	April	6	Vancouver	"	"	29	" 78	22 56
Carling, T. H.	"	6	London	"	"	34	" 178	13 79
Labatt, John	"	6	"	"	"	34	" 178	21 09
Walkerville Brewing Co., Ltd	"	6	Windsor	"	"	34	" 178	37 05

No. 16.—Refunds of Revenue—*Continued*.

EXCISE—*Continued*.

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1900.			$ cts.	$ cts.
Malt *Con*	Dawes, A. J.	April 6	Montreal	Refunded under Revised Statutes, cap. 34, sec. 178	21 87	
	Oland, J. C.	" 6	Halifax	" " 34 " 238	92 39	
	Wickwire, W. N.	" 6	"	" " 34 " 238	1,478 04	
	Victoria Phœnix Brewing Co., Ltd.	" 6	Victoria	" " 34 " 238	189 81	
	Wilson, W.	" 12	Toronto	" " 34 " 178	205 86	
	Ottawa Brewing and Malting Co.	May 22	Ottawa	" " 29 " 78	96 23	
	Carling, T. H.	June 27	London	" " 29 " 78	268 14	
	Walkerville Brewing Co., Ltd.	July 5	Windsor	" " 34 " 238	22 40	
	Victoria Phœnix Brewing Co., Ltd.	" 5	Victoria	" " 34 " 238	378 12	
	May, J. P.	" 5	Halifax	" " 34 " 238	16 23	
	Oland, J. C.	" 5	"	" " 34 " 238	39 57	
	Wickwire, W. N.	" 5	"	" " 34 " 238	1,082 76	
	Wilson, W.	" 10	Toronto	" " 29 " 78	194 15	
	The Lion Brewing Co., Ltd.	" 12	Vancouver	" " 29 " 78	20 70	
						50,090 01
		1899.				
Tobacco	Isaacs, A.	July 29	St. John, N.B.	" " 34 " 238	97 50	
	Tobin, John & Co.	" 29	Halifax	" " 28 " 52	28 42	
	McKenna, A.	" 29	Pictou	" " 29 " 78	2 15	
	"	" 29	"	" " 34 " 259	0 15	
	"	" 29	"	" " 34 " 238	315 06	
	The American Tobacco Co., Ltd.	" 29	Montreal	" " 34 " 238	148 70	
	Houde, B. & Co.	" 29	Quebec	" " 34 " 259	45 87	
	Isaacs, A.	" 29	St. John, N.B.	" " 34 " 259	25 10	
	The American Tobacco Co., Ltd.	" 29	Montreal	" " 34 " 270	33 60	
	McDonald, Sir W. C.	" 29	"	" " 34 " 238	176 00	
	The American Tobacco Co., Ltd.	Aug. 17	"	" " 34 " 270	129 60	
	Smith, L. M.	" 21	Halifax	" " 34 " 238	52 42	
	Brener, A. H.	" 22	London	" " 29 " 78	7 20	

McDonald, R. D.	"	22..	"	"	"	29	"	78....	16 80
McDonald, Sir W. C.	"	22..	Montreal	"	"	29	"	78....	129 10
Tuckett, Geo. T	"	22..	Hamilton	"	"	34	"	259....	32 29
Henry, J.	"	22..	Montreal	"	"	34	"	259....	6 85
Lemesurier, John	"	22..	Quebec	"	"	34	"	259....	2 92
Houde, B. & Co.	"	22..	"	"	"	34	"	259....	115 55
Fortier, J. M.	"	22..	Montreal	"	"	34	"	259....	7 31
The American Tobacco Co., Ltd	"	22..	"	"	"	34	"	259....	602 04
Isaacs, A	"	22..	St. John, N.B	"	"	34	"	259....	14 43
"	Sept.	20..	"	"	"	34	"	259....	12 31
"	"	20..	"	"	"	34	"	238....	186 93
Henry, J	"	25..	Montreal	"	"	34	"	259....	6 23
The American Tobacco Co., Ltd	"	25..	"	"	"	34	"	259....	696 40
Fortier, J. M.	"	25..	"	"	"	34	"	259....	29 21
Tuckett, Geo. T.	"	25..	Hamilton	"	"	34	"	259 ...	43 41
McDonald, Sir W. C.	"	25..	Montreal	"	"	34	"	238....	56 32
McKenna, A	"	25..	Pictou	"	"	34	"	238....	30 16
The American Tobacco Co., Ltd	"	25..	Montreal	"	"	34	"	270....	9 75
McKenna, A.	"	26..	Pictou	"	"	34	"	238....	555 87
The American Tobacco Co., Ltd	"	28..	Montreal	"	"	34	"	270....	4 29
Seeton, R. B. & Co.	"	28..	Halifax	"	"	34	"	238....	10 32
The American Tobacco Co., Ltd	Oct.	7..	Montreal	"	"	34	"	270....	55 57
Tuckett, G. T	"	9..	Hamilton	"	"	34	"	259 ...	63 55
"	"	9..	"	"	"	29	"	78....	23 40
McAlpin, E. A	"	9..	Toronto	"	"	29	"	78....	49 60
"	"	9..	"	"	"	34	"	259....	2 55
Lemesurier, John	"	17..	Quebec	"	"	34	"	259....	12 92
Houde, B. & Co.	"	17..	"	"	"	34	"	259....	229 76
Isaacs, A	"	17..	St. John, N.B	"	"	34	"	259....	20 78
Smith, L. M	"	17..	Halifax	"	"	34	"	238....	202 76
Ward, W	"	20..	London	"	"	29	"	78....	10 36
The American Tobacco Co., Ltd	"	23..	Montreal	"	"	34	"	238....	117 60
Henry, J.	"	30..	"	"	"	34	"	259...	6 01
Fortier, J. M.	"	30..	"	"	"	34	"	259 ...	1 32
The American Tobacco Co., Ltd	"	30..	"	"	"	34	"	259....	816 54
" "	"	30..	"	"	"	34	"	270 ..	13 53
Isaacs, A	"	30..	St. John, N.B	"	"	34	"	238....	130 50
McKenna, A	"	30..	Pictou	"	"	34	"	238...	1,181 88
McDonald, Sir W. C.	Nov.	6..	Montreal	"	"	34	"	238....	390 12
The American Tobacco Co., Ltd	"	9..	"	"	"	34	"	270 ...	16 54
Tuckett, Geo. T.	"	10..	Hamilton	"	"	29	"	78....	136 40

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.		Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1899.				$ cts.	$ cts.
Tobacco—*Con.*	Isaacs, A.	Nov.	20	St. John, N.B	Refunded under Revised Statutes, cap. 34, sec. 238	64 25	
	Bauld, Gibson & Co.	"	20	Halifax	" " 34 " 238	1 87	
	Smith, L. M	"	20	"	" " 34 " 238	68 16	
	Henry, J.	"	20	Montreal	" " 34 " 259	5 03	
	The American Tobacco Co., Ltd	"	20	"	" " 34 " 259	704 26	
	Fortier, J. M	"	20	"	" " 34 " 259	13 63	
	Houde, B. & Co.	"	20	Quebec	" " 34 " 259	55 79	
	Isaacs, A	"	20	St. John, N.B	" " 34 " 259	8 10	
	Tobin, John & Co.	"	27	Halifax	" " 34 " 238	50 86	
	McKenna, A.	"	27	Pictou	" " 34 " 238	276 40	
	Isaacs, A	"	28	St. John, N.B	" " 34 " 238	104 87	
	Smith, L. M	"	28	Halifax	" " 34 " 238	47 32	
	The American Tobacco Co., Ltd	"	28	Montreal	" " 34 " 270	7 31	
	Lemesurier, John	Dec.	5	Quebec	" " 34 " 259	2 37	
	Empire Tobacco Co	"	7	Sherbrooke	" " 29 " 78	153 00	
	Tuckett, Geo. T	"	9	Hamilton	" " 34 " 259	130 10	
	Lemesurier, John	"	9	Quebec	" " 34 " 259	3 70	
	Gratton, C. & Co	"	9	Montreal	" " 34 " 238	3 13	
	Houde, B. & Co.	"	9	Quebec	" " 34 " 238	37 50	
	Isaacs, A	"	11	St. John, N.B	" " 34 " 259	9 94	
	Tuckett, Geo. T.	"	14	Hamilton	" " 34 " 238	792 35	
	Henry, J	"	14	Montreal	" " 34 " 259	5 37	
	The American Tobacco Co., Ltd	"	14	"	" " 34 " 259	588 03	
	McAlpin, E. A	"	19	Toronto	" " 29 " 78	475 90	
	Tuckett, G. T.	"	19	Hamilton	" " 34 " 238	28 22	
	Houde, B. & Co.	"	19	Quebec	" " 34 " 259	80 59	
	The American Tobacco Co., Ltd	"	22	Montreal	" " 34 " 238	880 20	
	" "	"	27	"	" " 34 " 270	4 29	
	Tremain, S	"	27	Halifax	" " 34 " 238	3 44	
	Smith, L. M	"	27	"	" " 34 " 238	6 72	
	McKenna, A	"	27	Pictou	" " 34 " 238	210 96	
	McDonald, Sir W. C.	"	27	Montreal	" " 34 " 238	90 75	

	1900.						
Smith, L. M	Jan.	3	Halifax	"	"	34 " 238	12 24
Barry, H. D	"	3	Quebec	"	"	34 " 238	5 32
Tuckett, Geo. T	"	10	Hamilton	"	"	29 " 78	700 59
Houde, B., & Co	"	12	Quebec	"	"	34 " 259	56 23
Isaacs, A	"	12	St. John, N.B	"	"	34 " 259	5 62
Tuckett, Geo. T	"	12	Hamilton	"	"	34 " 259	29 58
"	"	12	"	"	"	29 " 78	18 76
Williams, J. S	"	12	Toronto	"	"	29 " 78	25 64
Craig, A. J	"	12	Pictou	"	"	34 " 238	3 74
McKenna, Bros	"	13	"	"	"	34 " 238	9 12
Henry, J	"	16	Montreal	"	"	34 " 259	6 28
The American Tobacco Co., Ltd	"	16	"	"	"	34 " 259	536 86
" "	Feb.	9	"	"	"	34 " 270	31 31
McDonald, Sir W. C	"	9	"	"	"	34 " 238	529 56
Isaacs, A	"	9	St. John, N.B	"	"	34 " 238	117 25
Smith, L. M	"	9	Halifax	"	"	34 " 238	10 32
McKenna, A	"	9	Pictou	"	"	34 " 238	623 44
Tuckett, G. T	"	13	Hamilton	"	"	34 " 238	137 37
"	"	13	"	"	"	34 " 259	32 04
Houde, B., & Co	"	13	Quebec	"	"	34 " 259	33 63
Isaacs, A	"	13	St. John, N.B	"	"	34 " 259	4 50
Hobrecker, A	"	13	Halifax	"	"	34 " 238	47 52
McKenna, A	"	13	Pictou	"	"	34 " 238	171 84
"	"	19	"	"	"	34 " 238	77 46
Henry, J	"	19	Montreal	"	"	34 " 259	4 80
The American Tobacco Co., Ltd	"	19	"	"	"	34 " 259	601 93
McKenna, A	"	21	Pictou	"	"	34 " 238	412 24
The American Tobacco Co., Ltd	Mar.	3	Montreal	"	"	34 270	5 85
Bauld, Bros., & Co	"	7	Halifax	"	"	34 " 238	25 43
Tuckett, G. T	"	9	Hamilton	"	"	34 " 259	28 00
The American Tobacco Co., Ltd	"	16	Montreal	"	"	34 " 238	454 75
Smith, L. M	"	16	Halifax	"	"	34 " 238	68 44
Fortier, J. M	"	16	Montreal	"	"	34 " 259	3 30
Henry, J	"	16	"	"	"	34 " 259	7 09
The American Tobacco Co., Ltd	"	16	"	"	"	34 " 259	512 39
Houde, B., & Co	"	16	Quebec	"	"	34 " 259	40 32
Isaacs, A	"	16	St. John, N.B	"	"	34 " 259	6 90
The American Tobacco Co., Ltd	"	26	Montreal	"	"	34 " 270	428 70
Tuckett, G. T	"	26	Hamilton	"	"	34 " 238	1,114 77
McDonald, Sir W. C	"	27	Montreal	"	"	34 " 238	227 68
"	"	29	"	"	"	29 " 78	13 00

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.		Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1900.				$ cts.	$ cts.
Tobacco—*Con.*	Tremain, S.	Mar.	29	Halifax	Refunded under Revised Statutes, cap. 29, sec. 78	37 50	
	Henry, J.	"	31	Montreal	" " 34 " 238	6 00	
	Davis, S., & Son	"	31	"	" " 34 " 238	34 25	
	Bauld, Gibson & Co.	"	31	Halifax	" " 34 " 238	1 87	
	Houde, B., & Co.	April	6	Quebec	" " 34 " 238	3 25	
	Hobrecker, A.	"	6	Halifax	" " 34 " 238	21 04	
	McKenna, A.	"	6	Pictou	" " 34 " 238	1,665 20	
	Williams, John S.	"	6	Toronto	" " 29 " 78	3 83	
	Isaacs, A.	"	10	St. John, N.B.	" " 34 " 238	24 37	
	Fortier, J. M.	"	10	Montreal	" " 34 " 270	21 45	
	Tuckett, G. T.	"	10	Hamilton	" " 34 " 259	64 94	
	"	"	10	"	" " 29 " 78	9 25	
	Isaacs, A.	"	11	St. John	" " 34 " 259	9 10	
	McKenna, A.	"	17	Pictou	" " 34 " 238	62 32	
	Henry, J.	"	17	Montreal	" " 34 " 259	6 20	
	The American Tobacco Co., Ltd	"	17	"	" " 34 " 259	459 30	
	Houde, B., & Co.	"	17	Quebec	" " 34 " 259	36 56	
	Fortier, J. M.	"	17	Montreal	" " 34 " 259	2 40	
	Lemesurier, John	"	23	Quebec	" " 34 " 259	9 87	
	The American Tobacco Co., Ltd	"	23	Montreal	" " 34 " 270	40 95	
	Tobin, John, & Co.	"	23	Halifax	" " 34 " 238	24 91	
	Fortier, J. M.	"	25	Montreal	" " 34 " 238	76 25	
	The American Tobacco Co., Ltd	"	27	"	" " 34 " 270	17 69	
	McKenna, A.	May	3	Pictou	" " 34 " 238	316 03	
	McDonald, Sir W. C.	"	3	Montreal	" " 34 " 238	21 99	
	The American Tobacco Co., Ltd	"	3	"	" " 34 " 238	18 53	
	Tuckett, G. T.	"	9	Hamilton	" " 34 " 259	40 87	
	Isaacs, A.	"	9	St. John, N.B.	" " 34 " 259	7 37	
	Nicholson, D.	"	9	Charlottetown	" " 34 " 270	37 60	
	Isaacs, A.	"	16	St. John, N.B.	" " 34 " 238	428 50	
	Smith, L. M.	"	16	Halifax	" " 34 " 238	3 36	
	"	"	17	"	" " 34 " 238	51 68	

	Tobin & Co., John	"	17	"	" " 34 " 238	50 86	
	Henry, J.	"	17	Montreal	" " 34 " 259	5 54	-
	The American Tobacco Co., Ltd	"	17	"	" " 34 " 259	718 79	
	Houde, B., & Co	"	17	Quebec	" " 34 " 259	62 84	
	Fortier, J. M.	"	17	Montreal	" " 34 " 259	1 20	
	McKenna, A	"	26	Pictou	" " 34 " 270	440 40	
	Isaacs, A.	"	29	St. John, N.B	" " 34 " 238	262 50	
	Fortier, J. M.	"	29	Montreal	" " 34 " 238	410 00	
	Smith, L M.	June	5	Halifax	" " 34 " 238	274 28	
	Isaacs, A	"	7	St. John, N.B	" " 34 " 238	293 75	
	Tuckett, G. T.	"	9	Hamilton	" " 34 " 259	46 06	
	Isaacs, A	"	9	St. John, N.B	" " 34 " 259	14 13	
	McKenna, A.	"	9	Pictou	" " 34 " 238	122 08	
	Smith, L. M.	"	13	Halifax	" " 34 " 238	140 96	
	Henry, J	"	18	Montreal	" " 34 " 259	7 48	
	Houde, B., & Co	"	18	Quebec	" " 34 " 259	80 15	
	The American Tobacco Co., Ltd	"	18	Montreal	" " 34 " 259	718 53	
	Fortier, J. M	"	13	"	" " 34 " 238	621 01	
	Smith, L. M.	"	23	Halifax	" " 34 " 238	20 16	
	McKenna, A	"	25	Pictou	" " 34 " 238	208 32	
	"	July	16	"	" " 34 " 259	0 25	
	Nicholson, D.	"	16	Charlottetown	" " 34 " 259	0 40	
	Henry, J	"	16	Montreal	" " 34 " 259	6 27	
	The American Tobacco Co., Ltd	"	16	"	" " 34 " 259	667 73	
	Fortier, J. M	"	16	"	" " 34 " 259	1 00	
	Houde, B., & Co	"	16	Quebec	" " 34 " 259	74 62	
	Isaacs, A.	"	16	St. John, N.B	" " 34 " 259	14 03	
	Tuckett, G. T.	"	16	Hamilton	" " 34 " 259	77 94	
	"	"	16	"	" " 29 " 78	7 55	
	Williams, J. S	"	16	Toronto	" " 29 " 78	4 78	
	McKenna, A.	"	16	Pictou	" " 29 " 78	2 55	
	Smith, L. M.	"	16	Halifax	" " 34 " 238	16 80	
	Tuckett, G. T.	"	16	Hamilton	" " 34 " 238	513 66	
	Isaacs, A	"	16	St. John, N B	" " 34 " 238	187 70	
	McKenna, A.	"	16	Pictou	" " 34 " 238	78 80	
	The American Tobacco Co., Ltd	"	16	Montreal	" " 34 " 270	196 55	
						29,152 27	
		1899.			Less Refund	17 84	
							29,134 43
Cigars	Brown, Sam.	Dec.	29	Ottawa	Refunded under Revised Statutes, cap. 29, sec. 78		37 50
Bonded Warehouse	Lees, C. H. A	Oct.	20	Brantford	" " 34 " 238		21 62
Other receipts.	Allen, S	"	20	"	" " 29 " 78	300 00	
	Lyman, Bros	Nov.	14	Montreal	" " 29 " 78	55 50	
	"	"	28	"	" " 29 " 78	2 50	
							358 00

No. 16.—Refunds of Revenue—*Concluded.*

EXCISE—*Concluded.*

Articles.	To whom paid.	Date.	Divisions.	From what Authority Refunded.	Amounts.	Totals.
		1899.			$ cts.	$ cts.
Seizures	Frankland, H. R.	Dec. 7	Toronto	Refunded under Revised Statutes cap. 29, sec. 78	5 00	
	Lawlor, H.	" 7	Montreal	" " 29 " 78	40 00	
	Boivin, C. A.	" 7	St. Hyacinthe	" " 29 " 78	9 00	
	Lawlor, H.	" 19	Montreal	" " 29 " 78	40 00	
		1900.		" "		
	Mills, W. S.	May 16	London	29 " 78	200 00	
	Morin, D. E.	June 27	Quebec	" " 29 " 78	190 00	484 00
				Total Excise		126,816 13
Electric Light	Kemptville Electric Lt. Co.	Jan. 12	Ottawa			50 00
Fertilizer's Fees	Rattenbury, B. M.	Sept. 12	Charlottetown			3 00
				Grand Total		126,869 13

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 17.—DEPARTMENTAL EXPENDITURES.

Dr. | Cr.

Due by sundry persons, July 1, 1899.	Disbursed by the Receiver General.	Deductions for Superannuation.	Totals.	—	Salaries.	Contingencies.	Due by sundry persons, June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
	7,000 00		7,000 00	Minister of Inland Revenue	7,000 00			7,000 00
	36,900 50	809 50	37,710 00	Departmental Officers	37,710 00			37,710 00
	278 01		278 01	Subscriptions to Newspapers		278 01		278 01
	1,831 79		1,831 79	Extra Clerks		1,831 79		1,831 79
	369 10		369 10	Telegraph Companies and Telephone		369 10		369 10
	1,150 19		1,150 19	Stationery		1,150 19		1,150 19
	315 18		315 18	Books and Maps		315 18		315 18
	789 59		789 59	Printing and Lithographing		789 59		789 59
	30 74		30 74	Postage		30 74		30 74
16 66	251 88		268 54	Sundry persons		251 88	16 66	268 54
16 66	48,916 98	809 50	49,743 14	Totals	44,710 00	5,016 48	16 66	49,743 14

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

WEIGHTS AND MEASURES, GAS, ELECTRIC LIGHT AND LAW STAMPS.

Dr. No. 18.—Statement showing amount of Revenue accrued during Year ended June 30, 1900. Cr.

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps. Supreme Court.	Law Stamps. Exchequer Court.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
To amount of stamps destroyed or returned by distributors	233 23	......	0 50	......	......	233 73
To commission allowed	......	......	......	75 00	175 25	250 25
To amount of stamps remaining in hands of distributors, June 30, 1900	37,934 68	28,710 55	33,972 50	......	......	100,617 73
To balance, being the revenue accrued during 1899-1900	52,962 29	20,649 75	9,809 00	1,425 00	3,329 75	88,175 79
Totals	91,130 20	49,360 30	13,782 00	1,500 00	3,505 00	189,277 50

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps. Supreme Court.	Law Stamps. Exchequer Court.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
By amount of stamps in the hands of distributors on July 1, 1899	39,818 70	31,145 30	31,532 25	......	......	102,196 25
By stamps issued by Inland Revenue Department during the year	51,311 50	18,215 00	12,249 75	1,500 00	3,505 00	86,781 25
Totals	91,130 20	49,360 30	43,782 00	1,500 00	3,505 00	189,277 50

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

WEIGHTS AND MEASURES.

No. 19 (A).—Inspection Divisions in Account with Revenue.

Dr. | Cr.

Balances due by Inspectors, July 1, 1899. Stamps on hand.	Balances due by Inspectors, July 1, 1899. Cash on hand.	Stamps issued to Inspect'rs.	Seizures and Penalties.	Other Receipts.	Totals.	Divisions.	Stamps returned or destroyed.	Deposited to the credit of the Receiver General.	Balances due by Inspectors, June 30, 1900. Stamps on hand.	Balances due by Inspectors, June 30, 1900. Cash on hand.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
3,455 35	363 05	4,781 00	35 00	....	8,634 40	Belleville	7 85	4,084 35	4,517 90	24 30	8,634 40
3,546 85	....	10,226 00	....	....	13,772 85	Hamilton	166 70	9,355 70	4,250 45	....	13,772 85
2,059 95	114 60	3,796 00	....	....	5,970 55	Ottawa	....	3,385 20	2,585 35	....	5,970 55
4,074 25	713 85	6,374 00	....	....	11,162 10	Toronto	2 00	6,383 46	4,446 44	330 20	11,162 10
1,957 30	....	6,286 00	....	7 00	8,250 30	Windsor	....	5,519 25	2,731 05	....	8,250 30
15,093 70	1,191 50	31,463 00	35 00	7 00	47,790 20	*Ontario*	176 55	28,727 96	18,531 19	354 50	47,790 20
11,760 00	1,027 11	8,020 00	25 00	....	20,832 11	Montreal	0 70	11,364 04	8,016 30	1,451 07	20,832 11
2,262 10	364 05	3,431 00	....	....	6,057 15	Quebec	....	3,011 25	2,875 47	170 43	6,057 15
1,909 85	....	2,717 00	....	....	4,626 85	Three Rivers	1 50	1,905 45	2,719 90	....	4,626 85
15,931 95	1,391 16	14,168 00	25 00	....	31,516 11	*Quebec*	2 20	16,280 74	13,611 67	1,621 50	31,516 11
1,999 30	....	156 00	....	....	2,155 30	*St. John, N. B.*	1 88	1,484 93	643 02	25 47	2,155 30
484 05	....	241 00	....	....	725 05	Cape Breton	52 60	129 68	540 77	2 00	725 05
678 35	....	453 50	....	....	1,131 85	Halifax	....	822 38	250 63	58 84	1,131 85
1,378 65	33 90	216 00	....	....	1,628 55	Pictou	....	838 20	790 35	....	1,628 55
2,541 05	33 90	910 50	....	....	3,485 45	*Nova Scotia*	52 60	1,790 26	1,581 75	60 84	3,485 45
554 75	....	181 00	....	....	735 75	*Charlottetown, P. E. I*	....	404 54	331 21	....	735 75
2,972 55	....	3,456 00	51 50	....	6,480 05	*Winnipeg, Man.*	....	3,774 96	2,705 09	....	6,480 05
310 35	....	181 00	....	....	491 35	*Calgary, N. W. T*	....	379 45	111 90	....	491 35
415 05	....	796 00	....	....	1,211 05	*Victoria, B. C.*	....	792 20	418 85	....	1,211 05
39,818 70	2,616 56	51,311 50	111 50	7 00	93,865 26	Grand Totals	233 23	53,635 04	37,934 68	2,062 31	93,865 26

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

WEIGHTS AND MEASURES, 1899-1900.

No. 19 (B).—Deputy Inspectors of the Old Divisions in Account with Revenue.

Dr. Cr.

Balances due July 1, 1899. — Cash on hand.	Totals.	Divisions.	Balances due June 30, 1900. — Cash on hand.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
87 10	87 10	Essex	87 10	87 10
87 10	87 10	*Ontario*	87 10	87 10
5 62	5 62	Hull	5 62	5 62
5 62	5 62	*Quebec*	5 62	5 62
92 72	92 72	Totals	92 72	92 72

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

WEIGHTS AND MEASURES, 1899–1900.

No. 20 (A).—Inspection Divisions in Account with Expenditures.

(*For Details, see Appendix B.*)

Dr. | Cr.

Amounts received from Department to meet Expenditures.	Deductions from Salaries for: Superannuation.	Insurance.	Retirement.	Guarantee	Balances due to Inspectors, June 30, 1900.	Totals.	Divisions.	Balances due to Inspectors, July 1, 1899.	Expenditures Authorized by the Department: Salaries.	Seizures.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	Balances due by Inspectors, June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
5,670 31	51 92			9 37		5,731 60	Belleville	206 58	3,399 92		541 58	230 00	965 84	387 68		5,731 60
6,746 34	32 08			14 40		6,792 82	Hamilton		5,721 77				972 02	99 03		6,792 82
4,885 88	7 04	41 76		9 90	125 00	5,069 58	Ottawa	15 62	3,659 96			250 00	957 24	186 76		5,069 58
5,766 16	27 96			10 05		5,804 17	Toronto	179 75	3,999 94				1,529 18	95 30		5,804 17
4,502 02	24 00			8 40		4,534 42	Windsor		3,449 76				928 48	156 18		4,534 42
27,570 71	143 00	41 76		52 12	125 00	27,932 59	*Ontario*	401 95	20,231 35		541 58	480 00	5,352 76	924 95		27,932 59
9,013 70	64 04			18 60	270 70	9,367 04	Montreal		7,440 70				1,630 04	296 30		9,367 04
6,294 83	48 28	38 28		12 60		6,393 99	Quebec	100 00	4,633 27			200 00	1,221 20	79 52	160 00	6,393 99
2,340 55			34 96	5 40		2,380 91	Three Rivers		1,699 96	2 50			661 05	17 40		2,380 91
17,649 08	112 32	38 28	34 96	36 60	270 70	18,141 94	*Quebec*	100 00	13,773 93	2 50		200 00	3,512 29	393 22	160 00	18,141 94
2,927 83	49 96			7 20		2,984 99	St. John, N.B.		2,500 00				465 52	19 47		2,984 99
1,164 09				3 60		1,167 69	Cape Breton	33 95	800 00			83 33	198 25	52 16		1,167 69
2,156 06				5 40		2,161 46	Halifax		1,599 96			225 00	182 55	153 95		2,161 46
1,910 85	19 96			5 40		1,936 21	Pictou		1,600 00				285 57	50 64		1,936 21
5,231 00	19 96			14 40		5,265 36	*Nova Scotia*	33 95	3,999 96			308 33	666 37	256 75		5,265 36

WEIGHTS AND MEASURES, 1899–1900.

No. 20 (A).—Inspection Divisions in Account with Expenditures—*Concluded.*

Dr. (*For Details, see Appendix B.*) Cr.

Amounts received from Department to meet Expenditures.	Deductions from Salaries for: Superannuation.	Insurance.	Retirement.	Guarantee.	Balances due to Inspectors, June 30, 1900.	Totals.	Divisions.	Balances due to Inspectors, July 1, 1899.	Expenditures Authorized by the Department: Salaries.	Seizures.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Balances due by Inspectors, June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1,722 69	....	....	....	6 90	....	1,729 59	Charlottetown, P.E.I.	2 80	1,500 00	....	....	....	185 75	41 04	....	1,729 59
5,169 82	4 04	..	...	10 80	....	5,184 66	Winnipeg, Man.	....	2,844 17	....	700 08	108 00	1,403 00	129 41	....	5,184 66
1,057 52	13 96	....	....	5 40	....	1,076 88	Calgary	....	899 92	....	....	...	174 25	2 71	...	1,076 88
6,227 34	18 00	....	...	16 20	..	6,261 54	*Manitoba.*	....	3,744 09	..	700 08	108 00	1,577 25	132 12	...	6,261 54
2,278 74	....	....	....	5 40	....	2,284 14	Victoria, B.C.	....	1,149 84	....	....	....	1,066 55	67 75	....	2,284 14
784 00	16 00	....	....	...	....	800 00	Commissioner of Standards	....	800 00	....	....	....	....	....	...	800 00
16 27	....	....	....	....	....	16 27	General	...	....	....	....	....	....	16 27	....	16 27
2,878 82	....	....	....	....	....	2,878 82	General Contingencies	....	....	....	....	....	....	2,878 82	....	2,878 82
520 19	...	....	....	....	..	520 19	Printing	....	....	....	....	....	....	520 19	....	520 19
280 82	....	....	....	....	....	280 82	Stationery	....	....	..	....	...	....	280 82	....	280 82
7 00	....	....	....	....	..	7 00	Lithographing	....	....	....	....	..	....	7 00		7 00
68,094 49	359 24	80 04	34 96	138 82	395 70	69,103 25	Grand Totals	538 70	47,699 17	2 50	1,241 66	1,096 33	12,826 49	5,538 40	160 00	69,103 25

Inland Revenue Department,
Ottawa, September 22, 1900.

E. MIALL,
Commissioner.

SESSIONAL PAPER No. 12

WEIGHTS AND MEASURES, 1899-1900.

No. 20 (B).—Inspection Divisions in Account with Expenditures.

DR. (Old Divisions). CR.

Balances due by sundry persons, July 1, 1899.	Totals.	Divisions.	Balances due by sundry persons, June 30, 1900.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
39 56	39 56	Essex	39 56	39 56
33 53	33 53	Waterloo	33 53	33 53
73 09	73 09	*Ontario*	73 09	73 09
0 33	0 33	Drummond	0 33	0 33
41 45	41 45	Laval	41 45	41 45
26 88	26 88	Montmorency	26 88	26 88
27 51	27 51	Richelieu	27 51	27 51
96 17	96 17	*Quebec*	96 17	96 17
24 00	24 00	Lunenburg, Nova Scotia	24 00	24 00
193 26	193 26	Totals	193 26	193 26

E. MIALL
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

GAS INSPECTION AND LAW STAMPS, 1899–1900.

Dr. No. 21.—Stamp Distributors in Account with Inland Revenue Department. Cr.

Balances due by Inspectors, July 1, 1899. Stamps on hand.	Balances due by Inspectors, July 1, 1899. Cash on hand.	Stamps issued to Inspectors and others.	Penalties.	Totals.	Districts.	Commission allowed to Distributors of stamps.	Deposited to the credit of the Receiver General.	Balances due by Inspectors. Stamps on hand.	Balances due by Inspectors. Cash on hand.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
814 50				814 50	Barrie		79 25	735 25		814 50
738 75		150 00		888 75	Belleville		236 00	652 75		888 75
421 50		125 00		546 50	Berlin		141 50	405 00		516 50
512 00		87 50		599 50	Brockville		175 75	423 75		599 50
318 75				318 75	Cobourg		140 00	178 75		318 75
386 50				386 50	Cornwall		42 50	341 00		386 50
509 00		175 00		684 00	Guelph		241 25	412 75		684 00
1,861 75	178 50	3,000 00		5,040 25	Hamilton		2,751 00	2,289 25		5,040 25
1,165 25		325 00		1,490 25	Kingston		345 25	1,145 00		1,490 25
167 75				167 75	Listowel		29 75	127 00	11 00	167 75
766 25	222 50	1,925 00	25 00	2,938 75	London		2,287 25	651 50		2,938 75
233 75	18 00			251 75	Napanee		61 75	190 00		251 75
3,308 00				3,308 00	Ottawa		734 75	2,573 25		3,308 00
361 25				361 25	Owen Sound		59 00	302 25		361 25
622 50	35 00	550 00		1,207 50	Peterborough		126 25	1,081 25		1,207 50
227 50		677 50		905 00	Sarnia		130 00	775 00		905 00
874 25		175 00		1,049 25	Stratford		185 50	863 75		1,049 25
6,062 80	570 25	4,500 00		11,133 05	Toronto		5,925 75	4,617 55	589 75	11,133 05
19,352 05	1,024 25	11,690 00	25 00	32,091 30	*Ontario*		13,692 50	17,798 05	600 75	32,091 30
2,094 00		4,450 00		6,544 00	Montreal		5,115 00	1,429 00		6,544 00
833 25	38 00	625 00		1,496 25	Quebec		280 25	1,158 50	57 50	1,496 25
518 50				518 50	Sherbrooke		38 00	480 50		518 50
3,445 75	38 00	5,075 00		8,558 75	*Quebec*		5,433 25	3,068 00	57 50	8,558 75
965 00				965 00	Fredericton		57 50	907 50		965 00
1,231 25		200 00		1,431 25	St. John		263 75	1,167 50		1,431 25
2,196 25		200 00		2,396 25	*New Brunswick*		321 25	2,075 00		2,396 25

1,227 00	106 75	....	....	1,333 75	*Halifax, N. S.*	....	553 00	689 50	91 25	1,333 75
882 00	....	....	....	882 00	*Charlottetown, P. E. I.*	....	66 00	816 00	....	882 00
556 75	....	537 50	....	1,094 25	*Winnipeg, Man.*	....	495 75	598 50	....	1,094 25
886 25	....	....	....	886 25	Nanaimo	....	36 00	850 25	....	886 25
1,618 50	27 50	387 50	....	2,033 50	Vancouver	....	286 25	1,732 25	15 00	2,033 50
980 75	....	325 00	....	1,305 75	Victoria	....	222 75	1,083 00	....	1,305 75
3,485 50	27 50	712 50	....	4,225 50	*British Columbia*	....	545 00	3,665 50	15 00	4,225 50
31,145 30	1,196 50	18,215 00	25 00	50,581 80	Grand Totals	....	21,106 75	28,710 55	764 50	50,581 80
....	....	5,005 00	....	5,005 00	Law stamps	250 25	4,754 75	....	....	5,005 00

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

GAS

No. 22.—INSPECTION Districts in

DR. (*For Details, see*

Balances due by Inspectors, July 1, 1899.	Amounts received from Department to meet expenditure.	Deductions from salaries for — Superannuation.	Retirement.	Guarantee.	Balances due to Inspectors, June 30, 1900.	Totals.	Divisions.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
....	95 65	2 00	....	3 60	....	101 25	..Barrie
....	575 63	4 96	....	4 80	....	585 39	..Belleville
....	45 87	0 32	....	0 60	13 46	60 25	..Berlin
....	102 19	....	....	....	21 41	123 60	..Brockville
....	151 35	2 00	....	3 60	....	156 95	..Cobourg
....	148 30	2 00	....	3 60	....	153 90	..Cornwall
....	116 92	2 00	....	3 60	3 10	125 62	..Guelph
....	2,104 41	36 00	....	5 40	13 60	2,159 41	..Hamilton
....	548 01	....	....	3 00	9 15	560 16	..Kingston
....	168 40	....	....	3 60	18 00	190 00	..Listowel
....	1,483 06	....	....	1 80	44 80	1,529 66	..London
....	22 15	....	....	....	....	22 15	..Napanee
....	1,865 30	....	....	3 60	57 08	1,925 98	..Ottawa
....	317 90	4 00	....	3 60	....	325 50	..Owen Sound
....	180 58	3 63	....	3 30	....	187 51	..Peterborough
....	21 25	....	....	....	5 60	26 85	..Sarnia
....	205 35	4 00	....	3 60	8 00	220 95	..Stratford
....	2,420 70	31 97	....	5 40	....	2,458 07	..Toronto
....	10,573 02	92 88	....	53 10	194 20	10,913 20	....*Ontario*
....	2,902 02	....	....	5 40	56 35	2,963 77	..Montreal
....	1,460 94	25 96	....	3 60	8 85	1,499 35	..Quebec
....	95 30	2 00	....	2 70	....	100 00	..Sherbrooke
....	4,458 26	27 96	....	11 70	65 20	4,563 12	....*Quebec*
....	196 40	....	....	3 60	....	200 00	..Fredericton
....	820 74	11 62	....	2 70	....	835 06	..St. John
....	1,017 14	11 62	....	6 30	....	1,035 06	.....*New Brunswick*
....	2,133 60	25 96	....	3 75	....	2,163 31	..Halifax
12 88	....	....	....	....	....	12 88	..Pictou
12 88	2,133 60	25 96	....	3 75	....	2,176 19	......*Nova Scotia*
....	144 92	....	....	2 10	11 71	158 73	....*Charlottetown, P.E.I.*
....	348 52	....	....	3 60	33 25	385 37	......*Winnipeg, Man.*
....	96 40	....	....	3 60	....	100 00	..Nanaimo
....	91 40	....	5 00	3 60	....	100 00	..New Westminster
....	348 50	6 00	....	3 60	10 50	368 60	.Vancouver
....	206 20	4 00	....	3 60	....	213 80	..Victoria
....	742 50	10 00	5 00	14 40	10 50	782 40	......*British Columbia*

INSPECTION.

Account with Expenditures, 1899–1900.

Appendix B.) Cr.

Balances due to Inspectors, July 1, 1899.	Expenditures authorized by the Department. Salaries.	Special assistance.	Rent.	Travelling Expenses.	Sundries.	Balances due by Inspectors, June 30, 1900.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
....	100 00	....	....	....	1 25	....	101 25
....	349 96	....	165 00	3 90	66 53	....	585 39
....	16 66	....	....	29 70	13 89	....	60 25
13 89	....	99 96	....	....	9 75	....	123 60
15 65	100 00	....	....	19 60	21 70	....	156 95
9 50	100 00	....	....	....	44 40	....	153 90
13 24	100 00	....	....	....	12 38	....	125 62
....	1,899 96	....	36 00	141 50	81 95	....	2,159 41
13 94	400 00	....	67 50	....	78 72	....	560 16
18 00	100 00	....	60 00	....	12 00	....	190 00
23 25	803 74	125 23	110 00	400 14	67 30	....	1,529 66
....	....	....	....	21 35	0 80	....	22 15
18 90	1,000 00	540 00	300 00	....	67 08	....	1,925 98
....	200 00	....	125 00	....	0 50	....	325 50
....	183 26	....	....	....	4 25	....	187 51
5 25	....	....	20 00	....	1 60	....	26 85
6 00	200 00	....	....	....	14 95	....	220 95
....	2,399 92	....	....	2 00	56 15	....	2,458 07
137 62	7,953 50	765 19	883 50	618 19	555 20	....	10,913 20
14 25	2,199 84	356 00	240 00	16 25	137 43	....	2,963 77
....	1,300 00	....	150 00	....	49 35	....	1,499 35
....	100 00	....	....	....	....	....	100 00
14 25	3,599 84	356 00	390 00	16 25	186 78	....	4,563 12
....	200 00	....	....	....	....	....	200 00
....	763 85	....	....	45 70	25 51	....	835 06
....	963 85	....	....	45 70	25 51	....	1,035 06
....	1,375 90	49 08	225 00	392 95	88 70	31 68	2,163 31
....	....	....	....	....	....	12 88	12 88
....	1,375 90	49 08	225 00	392 95	88 70	44 56	2,176 19
5 40	116 62	....	....	....	36 71	....	158 73
35 35	200 00	....	108 00	....	42 02	....	385 37
....	100 00	....	....	....	....	....	100 00
....	100 00	....	....	....	....	....	100 00
9 00	300 00	....	....	....	59 60	....	368 60
....	200 00	....	....	....	13 80	....	213 80
9 00	700 00	....	....	....	73 40	....	782 40

GAS

No. 22.—INSPECTION Districts in

DR.

(*For Details, see*

Balance due by Inspectors, July 1, 1899.	Accounts received from Department to meet expenditure.	Deductions from salaries for			Balance due to Inspectors, June 30, 1900.	Totals.	Divisions.
		Superannuation.	Retirement.	Guarantee.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
200 00	1,235 38	....	....	......	....	1,435 38	.General ....
....	1,189 43	....	....	....	....	1,189 43	..General expenses........ ....
....	394 80	....	....	....	....	394 80	..Printing . . ..
....	115 22	....	....	....	... .	115 22	..Stationery ....
....	85 00	....	....	....	....	85 00	..Lithographing.......... ...
212 88	22,437 79	168 42	5 00	94 95	314 86	23,233 90	......Grand Totals............

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

INSPECTION—*Concluded.*

Account with Expenditures, 1899–1900.

Appendix B.)

Balances due to Inspectors, July 1, 1899.	Expenditures authorized by the Department.					Balance due by Inspectors, June 30, 1900.	Totals.
	Salaries.	Special assistance.	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
....	....	....	....	30 70	1,204 68	200 00	1,435 38
....	....	....	....	....	1,189 43	....	1,189 43
....	....	....	....	....	394 80	....	394 80
....	....	....	....	....	115 22	....	115 22
....	....	....	....	....	85 00	....	85 00
201 62	14,909 71	1,170 27	1,606 50	1,103 79	3,997 45	244 56	23,233 90

E. MIALL,
Commissioner.

ELECTRIC LIGHT STAMPS 1899-1900.

No. 23.—Stamp Distributors in Account with Inland Revenue Department.

Dr. | Cr.

Balances, July 1, 1899. Stamps on hand.	Balances, July 1, 1899. Cash on hand.	Stamps issued to Inspectors	Registration Fees Accrued.	Penalties.	Totals.	Districts.	Returned damaged Stamps.	Deposited to the Credit of the Receiver General, Registration Fees.*	Deposited to the Credit of the Receiver General, Inspection Fees.	Balances, June 30, 1900. Stamps on hand.	Balances, June 30, 1900. Cash on hand.	Total.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ ct..	$ cts.	$ cts.	$ cts.
712 75	....	725 00	485 00	50 00	1,972 75	Belleville	....	485 00	436 75	1,051 00	....	1,972 75
2,017 25	31 50	150 00	355 00	....	2,553 75	Hamilton	....	355 00	238 00	1,960 75	....	2,553 75
2,036 25	8 50	200 00	635 00	....	2,879 75	London	0 50	635 00	330 00	1,914 25	....	2,879 75
6,407 50	....	525 00	380 00	....	7,312 50	Ottawa	....	380 00	869 75	6,062 75	....	7,312 50
5,872 00	73 00	1,719 75	890 00	....	8,584 75	Toronto	....	890 00	1,278 50	6,356 75	59 50	8,584 75
17,045 75	113 00	3,319 75	2,715 00	50 00	23,303 50	*Ontario*	0 50	2,745 00	3,153 00	17,315 50	59 50	23,303 50
4,789 75	....	3,225 00	275 00	....	8,289 75	Montreal	....	275 00	3,180 50	4,834 25	....	8,289 75
2,126 25	....	500 00	97 50	....	3,023 75	Quebec	....	97 50	535 25	2,338 50	52 50	3,023 75
185 75	....	525 00	345 00	....	1,055 75	Sherbrooke	....	345 00	207 50	503 25	....	1,055 75
7,401 75	....	4,250 00	717 50	....	12,369 25	*Quebec*	....	717 50	3,923 25	7,676 00	52 50	12,369 25
1,840 25	....	300 00	200 00	....	2,340 25	*St. John, N.B*	....	200 00	283 00	1,857 25	....	2,340 25
1,919 75	12 75	525 00	410 00	....	2,867 50	*Halifax, N.S*	....	410 00	314 00	2,139 25	4 25	2,867 50
946 25	....	1,225 00	270 00	....	2,441 25	*Winnipeg, Man*	....	270 00	1,179 75	991 50	....	2,441 25
1,151 50	....	2,400 00	190 00	....	3,755 75	Vancouver	....	190 00	703 25	2,801 00	58 50	3,755 75
1,227 00	....	200 00	60 00	....	1,487 00	Victoria	....	60 00	268 00	1,159 00	....	1,487 00
2,378 50	14 25	2,600 00	250 00	....	5,242 75	*British Columbia*	....	250 00	971 25	3,963 00	58 50	5,242 75
31,532 25	140 00	12,249 75	4,592 50	50 00	48,564 50	Grand Totals	0 50	4,592 50	9,824 25	33,972 50	174 75	48,564 50
....	....	....	....	50 00	50 00	Less Refunds as per Statement No. 16	....	....	50 00	....	....	50 00
31,532 25	140 00	12,249 75	4,592 50	....	48,514 50	Net Revenue	0 50	4,592 50	9,774 25	33,972 50	174 75	48,514 50

*These fees were collected by the Collectors of Inland Revenue.

Inland Revenue Department, Ottawa, September 22, 1900.

E. MIALL, *Commissioner.*

ELECTRIC LIGHT INSPECTION.

No. 24.—Inspection Districts in Account with Expenditures, 1899–1900.

(*For Details, see Appendix B.*)

Dr. Cr.

Balances due to Inspectors June 30, 1899	Amounts received from Department to meet Expenditures.	Totals.	—	Expenditures Authorized by the Department.				Totals.
				Salaries.	Special Assistance.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
....	2,818 65	2,818 65	Chief electrical engineer	2,347 29	....	421 80	49 56	2,818 65
....	134 90	134 90	Belleville	....	....	132 55	2 35	134 90
14 75	25 45	40 20	Hamilton	....	....	40 20	....	40 20
11 10	35 35	46 45	London	....	....	45 85	0 60	46 45
43 70	102 70	146 40	Toronto	....	....	143 70	2 70	146 40
75 55	327 18	402 73	Montreal	....	374 00	19 70	9 03	402 73
10 18	9 38	19 56	Quebec	....	....	....	19 56	19 56
40 05	53 25	93 30	Sherbrooke	....	....	90 95	2 35	93 30
2 12	71 18	73 30	St. John	....	....	69 78	3 52	73 30
61 40	69 35	130 75	Halifax	....	....	130 00	0 75	130 75
25 95	....	25 95	Winnipeg	....	....	24 00	1 95	25 95
63 00	....	63 00	Vancouver	....	....	52 50	10 50	63 00
0 80	....	0 80	Victoria	....	....	....	0 80	0 80
....	959 41	959 41	General	....	....	....	959 41	959 41
....	58 36	58 36	Printing	....	....	....	58 36	58 36
....	12 57	12 57	Stationery	....	....	....	12 57	12 57
348 60	4,677 73	5,026 33	Totals	2,347 29	374 00	1,171 03	1,134 01	5,026 33

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 25.—STATEMENT showing the Transactions in connection with the Manufacture of Methylated Spirits, 1899–1900.

DR.

—	Amounts.	Totals.
	$ cts.	$ cts.
To Stock on hand, July 1, 1899		7,144 96
Wood naphtha, 223·08 Std. Galls. at $1.40	1,152 31	
Methylated spirits { 1,538·18 Std. Galls. at $1.10	1,692 00	
Methylated spirits { 1,146·51 " $1.50	1,719 76	
Alcohol, 3,061·32 Proof Galls. at 30c.	918 39	
Drums, 123 at $10	1,230 00	
Barrels, 167 at $2.50	417 50	
Tin cans, 10 at $1.50	15 00	
Disbursements during the year, for :—		48,089 11
Alcohol, 62,364·28 Proof Galls. at 30c.	18,709 26	
" 17·04 " $1.26	21 47	
Wood naphtha, 4,729 Std. Galls. at 90c.	4,256 10	
" 13,208·43 Std. Galls. at $1.40 .... $18,491 78		
Less under payment 10 00		
	18,481 78	
Barrels, 1,696 at $2.50	4,240 00	
Half barrels, 1 at $2	2 00	
Drums, 233 at $10	2,330 00	
Cans, 6 at $2.25, 20 at $1 75	48 50	
Other expenses as follows :—		7,037 68
Rent of warehouse	900 00	
" motor power	125 00	
Heating	136 88	
Salaries	3,996 10	
Printing	13 41	
Stationery	15 97	
Freight	1,336 18	
Telephone	40 00	
Sundries	474 14	
Balance, being net profit over expenditure		18,811 28
Total		81,083 03

CR.

—	Amounts.	Totals.
	$ cts.	$ cts.
By methylated spirits, etc., sold as follows :—		61,964 80
612 Std. Galls. at $1.00	642 00	
8,051·31 " $1.08	8,695 41	
30,387·91 " $1.10	33,426 69	
10,592·44 " $1·50	15,888 67	
150 " wood naphtha at $1.40	210 80	
69·33 Proof Galls. alcohol at 30c.	20 00	
Drums, 219 at $10	2,190 00	
Barrels, 1,524 at $2.50	3,810 00	
Old drums, 13	10 75	
Tin cans, 3 at 50c., 10 at $1.50, 20 at $1.75, 6 at $2.25, 1 at $2.50	67 50	
Cartage, $2 ; fusel oil, 38c. ; refund, 60c.	2 98	
By sundries destroyed in conflagration of April 26, 1900, viz. :—		6,146 51
Wood naphtha, 4,389·51 Proof Galls. = 2,597·34 Std. Galls. at $1.40	3,636 28	
Alcohol, 2,421·71 Proof Galls. at 30c.	726 51	
Methylated spirits, 1,755·58 Proof Galls. = 1,221·5 Std. Galls. at $1.10	1,343 72	
Drums, 32 at $10	320 00	
Barrels, 48 at $2.50	120 00	
By balance on hand, June 30, 1900		9,971 72
Wood naphtha, 5,117·82 Proof Galls. =		
727·72 Std. Galls. American at $1.40	1,018 81	
2,025·67 " Canadian at $1.40	3,255 94	
Alcohol, 4,387·52 Proof Galls. at 30c.	1,316 26	
Methylated spirits, 2,911·68 Proof Galls. =		
1,108·50 Std. Galls. No. 1 at $1.10	1,219 35	
523·51 " No. 2 at $1.50	785 26	
126 " Special at $1.10	138 60	
Drums, 153 at $10	1,530 00	
Barrels, 283 at $2.50	707 50	
Total		81,083 03

INLAND REVENUE DEPARTMENT, OTTAWA, September 22, 1900.

E. MIALL, *Commissioner.*

SESSIONAL PAPER No. 12

No. 26.—STATEMENT showing the amounts voted and the Expenditure authorized for each service for the year ended June 30, 1900.

Services.	Grants.	Expenditures.	Over Expenditures.	Under Expenditures.
	$ cts.	$ cts.	$ cts.	$ cts.
Minister's salary	7,000 00	7,000 00		
Departmental salaries	37,660 00	37,710 00	50 00	
" contingencies	6,250 00	5,016 48		1,233 52
Excise salaries	312,395 00	306,430 23		5,964 77
" contingencies	50,000 00	49,162 60		837 40
" " on account of stamps	35,000 00	35,000 00		
Commission to Custom officers	5,500 00	5,500 51	0 51	
Duty pay	6,000 00	5,554 18		445 82
" other than special surveys	1,000 00	745 00		255 00
Cullers' salaries	5,850 00	5,850 00		
" contingencies	3,000 00	1,853 10		1,146 90
" fees	4,200 00	4,200 00		
" annuities	5,600 00	5,500 00		100 00
Preventive service	15,000 00	11,137 25		3,862 75
Minor revenues	200 00	27 50		172 50
Tobacco stamp commission	100 00	63 17		36 83
Weights and measures salaries	47,710 00	47,699 17		10 83
" " contingencies	20,500 00	20,510 46	10 46	
Gas inspection salaries	15,800 00	14,909 71		890 29
" contingencies	5,822 27	7,796 45	1,974 18	
Electric light inspection	4,677 73	4,677 73		
Inspection of staples	7,000 00	7,168 93	168 93	
Adulteration of food	25,000 00	24,577 10		422 90
Methylated spirits	50,000 00	55,126 79	5,126 79	
Metric system supplies	500 00	495 42		4 58
L. A. Fréchette translation	100 00	100 00		
	671,865 00	663,811 78	7,330 87	15,384 09

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX A

STATISTICS

APPENDIX A—SPIRITS.

No. 1.—Return of Manufactures for

Divisions.	Licenses.		Grain used for Distillation.				
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.	Wheat.
		$	Lbs.	Lbs,	Lbs.	Lbs.	Lbs.
Belleville, Ont.........	1	250	157,444	3,046,760	911,596	31,400	....
Brantford "	1	125	725	12,650	979	561	650
Guelph "	1	250	176,320	3,108,800	566,080	46,400	....
Hamilton "	1	250	124,096	2,426,734	513,004	38,570	....
Perth "	2	500	310,118	....	....	....	....
Prescott "	1	250	171,296	3,390,280	661,960	42,652	.... . .
Toronto "	1	250	598,815	10,618,240	2,324,880	130,335	....
Windsor "	1	250	809,340	10,522,000	1,919,260	131,700	....
Joliette, Que.........	1	250	785,990	611,800	692,500	....	....
Totals.......	10	2,375	3,134,144	33,737,264	7,590,259	421,618	650

Inland Revenue Department,
Ottawa, September 22, 1900.

SESSIONAL PAPER No. 12

the Year ended June 30, 1900.

Barley.	Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
....	4,147,200	251,821·49	....	....	250 00
....	15,565	572·16	215·02	408 54	533 54
....	3,897,600	232,767·74	82·62	156 98	406 98
....	3,102,404	179,716·17	....	....	250 00
....	310,118	16,090·49	195·67	375 69	875 69
....	4,266,188	250,965·00	....	....	250 00
26,240	13,698,510	829,501·24	....	....	250 00
....	13,382,300	788,932·84	....	262 32	512 32
....	2,090,290	108,189·92	....	....	250 00
26,240	44,910,175	2,658,557·05	493·31	1,203 53	3,578 53

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

No. 2.—Comparative Statement of Manufactures

Provinces.	Licenses.		Grain used for Distillation.			
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.
		$	Lbs.	Lbs.	Lbs.	Lbs.
1899.						
Ontario	8	2,000	4,311,603	43,897,860	8,969,950	573,520
Quebec	1	125	220,407	161,504	212,307	....
Totals	9	2,125	4,532,010	44,059,364	9,182,257	573,520
1900.						
Ontario	9	2,125	2,348,154	33,125,464	6,897,759	421,618
Quebec	1	250	785,990	611,800	692,500	....
Totals	10	2,375	3,134,144	33,737,264	7,590,259	421,618

Inland Revenue Department,
Ottawa, September 22, 1900.

for the Years ended June 30, 1899 and 1900.

Wheat.	Barley.	Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
Lbs.	Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
225,406	57,385	58,035,724	3,414,384·73	5,471·06	12,371 17	14,371 17
....	....	594,218	29,579·95	100·03	192 06	317 06
225,406	57,385	58,629,942	3,443,964·68	5,571·09	12,563 23	14,688 23
650	26,240	42,819,885	2,550,367·13	493·31	1,203 53	3,328 53
....	....	2,090,290	108,189·92	....	....	250 00
650	26,240	44,910,175	2,658,557·05	493·31	1,203 53	3,578 53

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

No. 3.—STATEMENT showing the Transactions in the Distilleries in

Divisions.	Spirits in process, including deficiencies brought forward.	Spirits manufactured during the year, including surpluses.	Spirits returned to Distillery for redistillation.	
			Duty paid.	In Bond.
	Galls.	Galls.	Galls.	Galls.
Belleville, Ont	1,404·43	251,821·49		
Brantford "		572·16		
Guelph "	6,372·73	232,767·74		19,602·93
Hamilton "	779·21	179,716·17	276·22	41,023·71
Perth "	79·89	16,090·49		
Prescott "	19,615·69	250,965·00		298·41
Toronto "	8,061·75	829,501·24	713·41	376,088·21
Windsor "	71,645·79	788,932·84		33,301·81
Joliette, Que	8,527·10	108,189·92		
Totals	116,486·59	2,658,557·05	989·63	470,315·07

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

the Dominion of Canada during the Year ended June 30, 1900.

Spirits received from other sources, duty paid.	Totals.	Spirits warehoused during the year.	Fusel Oil written off.	Deficiencies on which duty was collected.	Spirits in process, including deficiencies carried forward.	Totals.
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
....	253,225·92	250,257·87	1,371·70	....	1,596·35	253,225·92
....	572·16	572·16	....	....	....	572·16
1,156·87	259,900·27	240,439·50	1,170·87	82·62	18,207·28	259,900·27
206·37	222,001·68	220,986·25	509·79	....	505·64	222,001·68
....	16,170·38	16,038·69	....	22·63	109·06	16,170·38
565·57	271,444·67	243,273·70	1,263·42	....	26,907·55	271,444·67
410·08	1,214,774·69	1,203,641·41	4,984·01	....	6,149·27	1,214,774·69
484·05	894,364·49	835,104·67	2,546·65	....	56,713·17	894,364·49
....	116,717·02	102,686·49	....	....	14,030·53	116,717·02
2,822·94	3,249,171·28	3,113,000·74	11,846·44	105·25	124,218·85	3,249,171·28

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 4.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Placed in Warehouse.	Imported.	Received from other Divisions.	Totals.	Divisions.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.		Galls.	$ cts.
663,644·99	250,257·87	.....	13,031·42	926,934·28	Belleville, Ont	75,061·31	142,616 48
7,075·55	572·16	....	24,219·45	31,867·16	Brantford "	11,611·92	22,062 75
851·12	....	....	5,891·01	6,742·13	Cornwall "	6,066·27	11,525 77
913,595·05	240,439·50	....	91,769·05	1,245,803·60	Guelph "	223,007·00	423,713 89
515,756·27	220,986·25 *5·46	....	71,740·38	808,488·36	Hamilton "	103,349·80	196,372 30
1,769·30	....	....	29,825·11	31,594·41	Kingston "	20,190·00	38,361 14
10,071·66	....	....	36,070·52	46,142·18	London "	40,861·31	77,637 44
17,256·39	....	....	122,455·93	139,712·32	Ottawa "	116,290·91	220,960 42
3,061·32	.....	....	62,364·28	65,425·60	" Gvt. Wse. "	....	....
....	....	....	67·39	67·39	" Dep. Lab. "	....	....
1,570·05	....	....	9,669·83	11,239·88	Owen Sound "	9,742·95	18,515 21
59,525·17	16,038·69	....	21,672·77	97,236·63	Perth "	30,607·76	58,318 84
1,804·06	....	....	9,502·91	11,306·97	Peterboro' "	10,496·43	19,942 12
1,871·99	....	....	7,524·79	9,396·78	Port Arthur "	7,076·50	13,445 59
782,093·59	243,273·70	116,244·29	36,417·88	1,178,029·46	Prescott "	30,760·66	93,318 75
1,282·83	....	....	10,899·46	12,182·29	St. Cath'ines "	10,030·24	19,057 54
2,335·04	....	....	16,233·71	18,568·75	Stratford "	16,991·39	32,287 08
4,399,278·32	1,203,641·41	....	132,044·55	5,734,964·28	Toronto "	326,659·11	614,909 52
4,176,237·06	835,104·67	2,238·91	7,213·23	5,020,793·87	Windsor "	138,089·89	261,245 42
11,559,079·76	3,010,314·25 *5·46	118,483·20	708,613·67	15,396,496·34	Totals ...	1,176,884·45	2,264,290 26
25,041·45	102,686·49	....	16,826·89	144,554·83	Joliette, Que.	18,930·14	35,969 19
71,264·32	....	†222·15	620,225·06	691,711·53	Montreal "	576,800·77	1,085,501 70
30,580·60	....	....	195,943·98	226,524·58	Quebec "	180,674·97	343,282 88
4,261·52	....	....	24,431·33	28,692·85	St. Hya'nthe "	25,594·22	48,627 30
9,781·45	....	16,485·88	89,234·83	115,502·16	Sherbrooke "	69,698·49	137,373 83
1,561·25	....	....	11,288·03	12,849·28	Sorel "	11,881·98	22,575 89
1,770·83	....	....	29,705·83	31,476·66	Three Rivers "	25,883·92	49,279 14
2,356·06	....	....	12,028·72	14,384·78	Victoriaville "	11,687·17	22,205 62
146,617·48	102,686·49	16,485·88 †222·15	999,684·67	1,265,696·67	Totals ...	921,151·66	1,744,815 55
6,273·59	....	....	66,664·73	72,938·32	St. John, N.B.	61,254·04	116,382 82
8,025·09	....	....	28,374·30	36,399·39	Halifax, N.S.	29,801·95	56,626 02
400·59	....	....	837·38	1,237·97	Charlot'n, PEI	968·87	1,726 83
31,684·80	....	....	162,660·39	194,345·19	Winnipeg, Mn.	159,947·36	303,903 97
5,011·37	....	....	13,989·49	19,000·86	Calgary, NWT	12,456·96	23,668 28
33,018·18	....	....	111,070·11	144,088·29	Vanc'ver, B.C.	102,337·50	194,442 54
22,268·43	....	....	59,160·31	81,428·74	Victoria "	58,833·35	111,783 12
55,286·61	....	....	170,230·42	225,517·03	Totals	161,170·85	306,225 66
8,612·54	....	....	....	8,612·54	Sundries	....	....
11,820,991·83	3,113,000·74 *5·46	134,969·08 †222·15	2,151,055·05	17,220,214·31	Grand Totals..	2,523,576·14	‡4,817,639 39

* Surplus. † Seizure. ‡ This amount includes $40,490.72 collected on imported spirits used in Bonded Factories at 50c. per gallon.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

for the Year ended June 30, 1900. Cr.

Removed in Bond.		Free.						
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.	Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
Galls.	Galls.	Galls.	Galls.	Galls	Galls.	Galls.	Galls.
178,144 20	...	4,719·32	...	2,040·79	...	666,968·66	926,934·28
...	...	...	...	...	14,198·67	6,056·57	31,867·16
...	...	...	...	...	...	675·86	6,742·13
91,838·75	19,602·93	22,268·64	1,070·15	6,486·65	...	881,529·48	1,245,803·60
126,602·78	41,023·71	7,043·76	817·83	415·37	15,245·37	513,989·74	808,488·36
71·77	...	...	...	19·33	6,871·76	4,441·55	31,594·41
...	...	...	...	140·05	...	5,140·82	46,142·18
83·40	...	...	256·80	...	...	23,081·21	139,712·32
...	...	...	2,491·04	...	58,547·04	4,387·52	65,425·60
...	...	...	67·39	...	...	...	67·39
...	...	...	...	...	...	1,496·93	11,239·88
2,871·72	...	803·62	...	1·60	...	62,951·93	97,2[illegible]6·63
...	...	...	...	...	...	810·54	11,306·97
79·17	...	...	...	...	...	2,241·11	9,396·78
267,634·52	298·41	3,879·55	664·47	1,826·43	116,244·29	756,721·13	1,178,029·46
...	...	...	...	55·58	...	2,096·47	12,182·29
...	...	...	...	...	...	1,577·36	18,568·75
803,149 56	376,088·21	29,979·50	1,242·53	7,408·77	58,855·19	4,131,581·41	5,734,964·28
629,627·79	33,301·81	53,757·54	11·96	117,175·22	2,238·91	4,046,599·75	5,020,793·87
2,100,103·66	470,315 07	122,451·93	6,622·17	135,569·79	213,654·19 §58,547·04	11,112,348 04	15,396,496·34
...	...	...	...	...	...	125,624·69	144,554·83
41,083·06	...	...	98·80	502·06	14,742·52	58,484·32	691,711·53
4,786·50	...	...	87·60	16·55	16,980·58	23,978·38	226,524·58
...	...	...	...	...	1,506·30	1,592·33	28,692·85
262·18	...	...	...	...	35,988·87	9,552·62	115,502·16
...	...	...	...	...	...	967·30	12,849·28
...	...	...	...	...	...	5,592·74	31,476·66
...	...	...	...	...	...	2,697·61	14,384·78
46,131·74	...	...	186·40	518·61	69,218·27	228,489·99	1,265,696·67
330·45	...	...	124·65	3·18	3,892·50	7,333·50	72,938 32
...	...	...	...	108·12	...	6,489·32	36,399 39
...	...	...	...	...	...	329·10	1,237·97
3,559·25	...	...	321·75	150·65	...	30,366·18	194,345·19
...	...	...	...	...	...	6,543·90	19,000·86
123·49	...	...	1,442·46	447·74	...	39,737 10	144,088·29
806·46	...	...	72·10	1,839·11	...	19,877·72	81,428·74
929·95	...	...	1,514·56	2,286·85	...	59,614·92	[illegible]25,517·03
...	...	...	...	...	...	8,612·54	8,612·54
‡2,151,055·05	470,315·07	122,451·93	8,769·53	138,637·20	286,764·96 §58,547·04	11,460,127·39	17,220,244·31

§ Used in the manufacture of methylated spirits at the Government Warehouse, Ottawa.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 5.—COMPARATIVE STATEMENT of Warehouse

Remaining in Warehouse from last year.	Placed in Warehouse.	Imported.	Received from other Divisions.	Totals.	PROVINCES.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.	1899.	Galls.	$ cts.
11,015,610·38	3,893,040·83	103,990·82	741,117·85	15,753,759·88	Ontario.	1,121,158·61	2,155,129 14
121,942·21	21,052·85	*116·78 41,697·83	954,899·02	1,139,708·69	Quebec........	868,333·66	1,651,088 00
6,030·08	....	....	59,330·45	65,360·53	N. Brunswick..	57,446·41	109,148 03
7,566·34	.....	....	29,116·35	36,682·69	Nova Scotia...	28,368·29	53,899 69
65·40	....	....	663·23	728·63	P. E. Island...	328·04	623 00
26,304·94	....	....	157,045·21	183,350·15	Manitoba..	147,492·51	280,236 61
2,209·18	.....	....	12,810·20	15,019·38	N. W. Territ ..	10,008·01	19,015 26
71,695·09	....	....	157,356·25	229,051·34	B. Columbia...	171,463·32	325,791 51
8,612·54	....	....	....	8,612·54	Sundries.... ..	....	....
11,260,036·16	3,914,093·68	*116·78 145,688·65	2,112,338·56	17,432,273·83	....Totals. ...	2,404,598·85	4,594,931 24
					1900.		
11,559,079·76	*5·46 3,010,314·25	118,483·20	708,613·67	15,396,496·34	Ontario..	1,176,884·45	2,264,290 26
146,617·48	102,686·49	†222·15 16,485·88	999,684·67	1,265,696·67	Quebec........	921,151·66	1,744,815 55
6,273·59	....	....	66,664·73	72,938·32	N. Brunswick..	61,254·04	116,382 82
8,025·09	....	....	28,374·30	36,399·39	Nova Scotia...	29,801·95	56,626 02
400·59	....	....	837·38	1,237·97	P. E. Island...	908·87	1,726 83
31,684·80	....	.....	162,660·39	194,345·19	Manitoba..	159,947·36	303,903 97
5,011·37	....	.....	13,989·49	19,000·86	N. W. Territ ..	12,456·96	23,668 28
55,286·61	....	....	170,230·42	225,517·03	B. Columbia...	161,170·85	306,225 66
8,612·54	....	....	....	8,612·54	Sundries ...	....	....
11,820,991·83	*5·46 3,113,000·74	†222·15 134,969·08	2,151,055·05	17,220,244·31	....Totals.. ..	2,523,576·14	4,817,639 39

* Surplus. † Seizure.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

SESSIONAL PAPER No. 12

Returns for the Years ended June 30, 1899 and 1900. Cr.

Removed in Bond.		Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
2,068,581·81	475,006·59	133,354·37	4,550·05	118,293·69	*86,217·67 187,517·33	11,559,079·76	15,753,759·88
38,676·86			396·08	160·41	85,524·20	146,617·48	1,139,708·69
				23·60	1,616·93	6,273·59	65,360·53
				289·31		8,025·09	36,682·69
						400·59	728·63
4,057·04				115·80		31,684·80	183,350·15
						5,011·37	15,019·38
1,022·85				1,278·56		55,286·61	229,051·34
						8,612·54	8,612·54
2,112,338·56	475,006·59	133,354·37	4,946·13	120,161·37	274,658·46 86,217·67	11,820,991·83	17,432,273·83
2,100,103·66	470,315·07	122,451·93	6,622·17	135,569·79	‡58,547·04 213,654·19	11,112,348·04	15,396,496·34
46,131·74			186·40	518·61	69,218·27	228,489·99	1,265,696·67
330·45			124·65	3·18	3,892·50	7,333·50	72,938·32
				108·12		6,489·32	36,399·39
						329·10	1,237·97
3,559·25			321·75	150·65		30,366·18	194,345·19
						6,543·90	19,000·86
929·95			1,514·56	2,286·85		59,614·82	225,517·03
						8,612·54	8,612·54
2,151,055·05	470,315·07	122,451·93	8,769·53	138,637·20	‡58,547·04 286,764·96	11,460,127·39	17,220,244·31

‡ Used in the manufacture of Methylated Spirits at the Government Warehouse, Ottawa.

	1899.	1900.
Total duty collected ex-manufactory and ex-warehouse	$4,607,494 47	$4,818,842 92
" " on Licenses	2,125 00	2,375 00
Totals	$4,609,619 47	$4,821,217 92

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MALT.

No. 6.—Return of Manufactures for the Year ended June 30, 1900.

Divisions.	Licenses. No.	Licenses. Fees.	Grain placed in Steep.	Malt manufactured at 1½c. per lb.	Warehoused.	Total Duty collected ex-Manufactory, including License Fees.
		$	Lbs.	Lbs.	Lbs.	$ cts.
Belleville, Ont	1	50	414,849	333,518	333,518	50 00
Brantford "	2	100	729,745	590,675	590,675	100 00
Guelph "	9	875	7,176,225	5,744,961	5,744,961	875 00
Hamilton "	3	500	6,478,477	5,299,772	5,299,772	500 00
Kingston "	2	250	4,562,476	3,694,954	3,694,954	250 00
London "	3	450	6,487,135	5,186,198	5,186,198	450 00
Ottawa "	1	50	243,080	196,928	196,928	50 00
Owen Sound, Ont	1	150	1,780,792	1,401,984	1,401,984	150 00
Perth "	2	100	376,766	299,562	299,562	100 00
Peterborough "	2	250	1,776,135	1,407,924	1,407,924	250 00
Prescott "	4	350	2,266,760	1,811,997	1,811,997	350 00
St. Catharines "	2	100	1,002,984	810,302	810,302	100 00
Stratford "	1	200	5,674,100	4,638,020	4,638,020	200 00
Toronto "	10	1,400	19,320,233	15,451,473	15,451,473	1,400 00
Windsor "	1	200	1,785,650	1,471,120	1,471,120	200 00
Totals	44	5,025	60,075,407	48,339,388	48,339,388	5,025 00
Montreal, Que	3	600	11,609,100	9,397,090	9,397,090	600 00
Quebec "	1	150	1,261,893	1,011,796	1,011,796	150 00
Totals	4	750	12,870,993	10,408,886	10,408,886	750 00
Halifax, N.S	2	150	711,940	576,810	576,810	150 00
Winnipeg, Man	2	200	1,921,597	1,531,037	1,531,037	200 00
Calgary, N.W.T	2	150	816,664	640,908	640,908	150 00
Grand totals	54	6,275	76,396,601	61,497,029	61,497,029	6,275 00

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—MALT.

No. 7.—Comparative Statement of Manufactures for the Years ended June 30, 1899 and 1900.

Provinces.	Licenses. No.	Licenses. Fees.	Grain placed in Steep.	Malt manufactured at $1\frac{1}{2}$ cents per lb.	Paid Duty ex-Manufactory.	Warehoused.	Total Duty collected ex-Manufactory, including License Fees.
1899.		$	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
Ontario	42	4,825	60,342,253	48,825,958	....	48,825,958	4,825 00
Quebec	4	750	11,901,473	9,632,619	....	9,632,619	750 00
Nova Scotia	1	100	619,773	500,008	....	500,008	100 00
Manitoba	4	300	1,790,738	1,377,888	14,548	1,363,340	518 22
N. W. Territories	4	250	858,103	675,627	4,573	671,054	318 60
British Columbia	1	50	11,737	8,739	....	8,739	50 00
Totals	56	6,275	75,524,077	61,020,839	19,121	61,001,718	6,561 82
1900.							
Ontario	44	5,025	60,075,407	48,339,388	....	48,339,388	5,025 00
Quebec	4	750	12,870,993	10,408,886	....	10,408,886	750 00
Nova Scotia	2	150	711,940	576,810	....	576,810	150 00
Manitoba	2	200	1,921,597	1,531,037	....	1,531,037	200 00
N. W. Territories	2	150	816,664	640,908	....	640,908	150 00
Totals	54	6,275	76,396,601	61,497,029	....	61,497,029	6,275 00

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX A—*Continued*—MALT.

DR. No. 8.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Placed in Warehouse.	Increases.	Received from other Divisions.	Imported.	Totals.	Divisions.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
81,652	333,518	1,174	....	....	416,344	Belleville, Ont
218,194	590,675	7,188	160,000	....	976,057	Brantford "
2,199,933	5,744,961	111,273	583,603	....	8,639,770	Guelph "
786,205	5,299,772	69,834	....	....	6,155,812	Hamilton "
2,314,006	3,694,954	50,440	....	....	6,059,400	Kingston "
2,476,728	5,186,198	33,140	80,000	....	7,776,066	London "
3,913	196,928	....	281,314	....	482,155	Ottawa "
383,434	1,401,984	23,592	578,450	....	2,387,460	Owen Sound "
8,535	299,562	104	32,000	....	340,201	Perth "
803,700	1,407,924	37,812	21,935	....	2,271,371	Peterborough "
....	....	....	91,600	....	91,600	Port Arthur "
774,259	1,811,997	30,208	....	....	2,616,464	Prescott "
235,138	810,302	7,252	66,000	....	1,118,692	St. Catharines "
592,780	4,638,020	39,816	370,612	....	5,641,228	Stratford "
4,774,497	15,451,473	138,790	103,022	....	20,467,782	Toronto "
1,009,025	1,471,120	6,083	675,000	39,873	3,201,101	Windsor "
16,662,0[illegible]0	48,339,388	556,706	3,043,536	39,873	68,641,503	Totals
35,875	....	2,645	750,000	....	788,520	Joliette, Que
3,958,360	9,397,090	136,558	616,000	43,128	14,151,136	Montreal "
17,200	1,011,796	....	2,008,000	....	3,036,996	Quebec "
30,723	....	1,866	842,000	....	874,589	Sherbrooke "
4,042,158	10,408,886	141,069	4,216,000	43,128	18,851,241	Totals
30,000	....	....	835,290	....	865,290	St. John, N.B.
102,195	576,810	2,335	1,944,330	....	2,625,670	Halifax, N.S.
3,600	....	....	130,000	....	133,600	Charlottetown, P.E.I.
398,223	1,531,037	21,311	514,000	....	2,464,571	Winnipeg, Man.
234,048	640,908	9,378	....	....	884,334	Calgary, N.W.T.
229,963	....	....	350,712	1,976,408	2,557,083	Vancouver, B.C.
80,000	....	....	600,000	727,221	1,407,221	Victoria "
309,963	....	....	950,712	2,703,629	3,964,304	Totals
21,782,187	61,497,029	730,799	11,633,868	2,786,630	98,430,513	Grand Totals

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

SESSIONAL PAPER No. 12

for the Year ended June 30, 1900. Cr.

Entered for Consumption at 1½ cents per lb.			Removed to other Divisions.	Exported.	Free, and Written off by Authority.	Remaining in Warehouse.	Totals.
Lbs.	$	cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
290,246	4,353	69	...	...	...	126,098	416,344
816,047	12,240	70	...	...	...	160,010	976,057
4,981,579	74,723	69	1,858,216	12,600	...	1,787,375	8,639,770
3,505,536	52,583	04	983,000	...	...	1,667,276	6,155,812
3,746,756	56,201	34	580,000	...	...	1,732,644	6,059,400
4,322,720	64,841	53	872,330	...	335,995	2,245,021	7,776,066
223,063	3,345	95	...	...	...	259,092	482,155
1,075,330	16,129	98	934,400	...	...	377,730	2,387,460
...	...		...	...	318,653	21,548	340,201
776,035	11,641	53	637,022	315,250	...	543,064	2,271,371
68,157	1,022	37	...	...	...	23.443	91,600
1,559,548	23,393	23	6,000	...	...	1,050,916	2,616,464
975,748	14,636	21	...	...	...	142,944	1,118,692
1.594,420	23,916	30	2,179,450	...	...	1,867,358	5,641,228
13,259,610	198,894	18	1,377,935	...	...	5,830,237	20,467,782
2,100,484	31,507	26	93,603	100	221,306	785,608	3,201,101
39,295,279	589,431	00	9,521,956	327,950	875,954	18,620,364	68,641,503
...	...		...	...	785,990	2,530	788,520
7,627,846	114,417	69	1,770,000	...	...	4,753,290	14,151,136
2,972,996	44,594	86	...	...	...	64,000	3,636,996
842.039	12,630	59	...	...	...	32,550	874,589
11,442,881	171,643	14	1,770,000	...	785,990	4.852,370	18,851,241
804.964	12,074	46	...	...	...	60,326	865,290
2,408,669	36,130	05	18,000	...	...	199,001	2,625.670
121,320	1,819	80	...	...	...	12,280	133,600
1,933,511	29,002	66	139,200	...	...	391,860	2,464,571
475,489	7,132	36	184,712	...	752	223,381	884,334
2,394,730	35,921	10	...	...	600	161,753	2,557,083
1,407,221	21,108	24	...	...	...	...	1.407,221
3,801,951	57,029	34	...	...	600	161,753	3,964,304
60,284,064	904,262	81	11,633,868	327,950	1,663,296	24,521,335	98.430,513

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MALT.

DR. No. 9.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from last year.	Placed in Warehouse.	Increases.	Received from other Divisions.	Imported.	Totals.		PROVINCES.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		1899.
14,837,162	48,825,958	467,955	3,304,009	61,750	67,496,834		Ontario
1,080,120	9,632,619	68,991	3,360,682	12,442	14,154,854		Quebec
31,550	....	....	778,000	....	809,550		New Brunswick
54,266	500,008	2,491	2,071,000	....	2,627,765		Nova Scotia
....	....	....	144,000	....	144,000		Prince Edward Island
381,127	1,363,349	11,462	270,000	....	2,025,929		Manitoba
112,552	671,054	1,464	....	....	785,070		N. W. Territories
79,769	8,739	....	1,482,000	2,313,590	3,884,098		British Columbia
16,576,546	61,001,718	552,363	11,409,691	2,387,782	91,928,100		Totals
							1900.
16,662,000	48,339,388	556,706	3,643,536	39,873	68,641,503		Ontario
4,042,158	10,408,886	141,969	4,216,000	43,128	18,851,241		Quebec
30,000	....	....	835,290	....	865,290		New Brunswick
102,195	576,810	2,335	1,944,330	....	2,625,670		Nova Scotia
3,600	....	....	139,000	....	133,600		Prince Edward Island
398,223	1,531,037	21,311	514,060	....	2,464,571		Manitoba
234,048	640,908	9,378	....	....	884,334		N. W. Territories
309,963	....	....	950,712	2,703,629	3,964,304		British Columbia
21,782,187	61,497,029	730,799	11,633,868	2,786,630	98,430,513		Totals

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

for the Years ended June 30, 1899 and 1900. Cr.

Entered for Consumption at 1½ cents per lb.		Removed to other Divisions.	Exported.	Free, and Written off by Authority.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
38,280,111	574,202 51	10,232,609	301,774	2,020,340	16,662,000	67,496,834
8,953,207	134,297 99	939,082	......	220,407	4,042,158	14,154,854
779,550	11,693 25	......	......	......	30,000	809,550
2,525,570	37,883 56	......	......	......	102,195	2,627,765
140,400	2,106 00	......	......	......	3,600	144,000
1,495,706	22,435 61	132,000	......	......	398,223	2,025,929
445,022	6,675 36	106,000	......	......	234,048	785,070
3,574,135	53,612 24	......	......	......	309,963	3,884,098
56,193,701	842,906 52	11,409,691	301,774	2,240,747	21,782,187	91,928,100
39,295,279	589,431 00	9,521,956	327,950	875,954	18,620,364	68,641,503
11,442,881	171,643 14	1,770,000	......	785,990	4,852,370	18,851,241
804,964	12,074 46	......	......	......	60,326	865,290
2,408,669	36,130 05	18,000	......	......	199,001	2,625,670
121,320	1,819 80	......	......	......	12,280	133,600
1,933,511	29,002 66	139,200	......	......	391,860	2,464,571
475,489	7,132 36	184,712	......	752	223,381	884,334
3,801,951	57,029 34	......	......	600	161,753	3,964,304
60,284,064	904,262 81	11,633,868	327,950	1,663,296	24,521,335	98,430,513

	1899	1900
Total duty collected ex-manufactory and ex-warehouse..........	$843,193 34	$904,262 81
" " on licenses	6,275 00	6,275 00
Totals.	$849,468 34	$910,537 81

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MALT LIQUOR.

No. 10.—Return of Manufactures for the Year ended June 30, 1900.

Divisions.	Licenses. No.	Licenses. Fees.	Malt used.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
		$	Lbs.	Lbs.	Galls.	Galls	$ cts.
Belleville, Ont	1	50	123,660	......	49,775	...	50 00
Brantford "	3	150	808,821	....	317,295	....	150 00
Guelph "	8	375	4,794,310	....	1,841,536	......	375 00
Hamilton "	3	150	2,869,971	....	1,288,252	....	150 00
Kingston "	2	100	431,246	......	139,900	....	100 00
London "	6	300	4,568,764	....	1,768,915	1,174	300 00
Ottawa "	3	125	528,657	....	199,432	....	125 00
Owen Sound "	6	300	1,114,839	....	435,800	......	300 00
Peterborough "	4	200	810,623	....	285,650	......	200 00
Port Arthur "	1	50	89,757	....	37,766	....	50 00
Prescott "	3	150	1,358,187	......	460,679	....	150 00
St. Catharines "	2	100	927,360	....	350,650	....	100 00
Stratford "	5	250	498,602	....	232,700	....	250 00
Toronto "	13	650	12,269,234	....	5,117,078	....	650 00
Windsor "	3	150	1,529,117	....	730,138	2,587	150 00
Totals	63	3,100	32,723,148	.....	13,255,566	3,761	3,100 00
Joliette, Que	1	50	11,300	....	3,493	......	50 00
Montreal "	10	500	12,309,493	....	4,725,776	705	500 00
Quebec "	4	200	3,385,245	....	1,236,280	......	200 00
Sherbrooke "	2	100	861,003	....	337,540	......	100 00
St. Hyacinthe "	1	50	10,800	....	3,780	......	50 00
Totals	18	900	16,577,841	....	6,306,869	705	900 00
St. John, N. B.	2	100	1,189,364	......	438,820	......	100 00
Halifax, N. S.	4	200	2,641,081	....	916,843	176,486	200 00
Charlottetown, P. E. I.	1	50	121,320	....	42,000	....	50 00
Winnipeg, Man	7	350	1,904,007	....	687,868	....	350 00
Calgary, N. W. T.	3	150	430,045	....	157,020	....	150 00
Vancouver, B. C.	32	1,575	2,410,201	5,351	989,711	......	1,958 90
Victoria "	5	250	1,484,721	4,000	514,475	38,282	365 00
Totals	37	1,825	3,894,922	9,351	1,504,186	38,282	2,323 90
Grand Totals	135	6,675	59,481,728	9,351	23,309,172	219,234	7,173 90

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX A—*Continued*—MALT LIQUOR.

No. 11.—Comparative Statement of Manufactures for the Years ended June 30, 1899 and 1900.

Provinces.	Licenses. No.	Licenses. Fees.	Malt used.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
1899.		$	Lbs.	Lbs.	Galls.	Galls.	$ cts.
Ontario	65	3,225	30,171,094	850	11,999,062	2,452	3,282 00
Quebec	21	975	15,207,831	....	5,677,491	....	975 00
New Brunswick	2	100	1,226,014	....	455,755	....	100 00
Nova Scotia	4	175	2,437,171	....	850,398	177,977	175 00
Prince Edward Island	2	75	147,500	....	45,045	....	75 00
Manitoba	7	350	1,491,428	....	520,837	....	350 00
N. W. Territories	4	200	398,408	....	144,525	....	200 00
British Columbia	34	1,650	3,692,723	....	1,408,760	35,731	1,650 00
Totals	139	6,750	54,772,169	850	21,101,873	216,160	6,807 00
1900.							
Ontario	63	3,100	32,723,148	....	13,255,566	3,761	3,100 00
Quebec	18	900	16,577,841	....	6,306,869	705	900 00
New Brunswick	2	100	1,189,364	....	438,820	....	100 00
Nova Scotia	4	200	2,641,081	....	916,843	176,486	200 00
Prince Edward Island	1	50	121,320	....	42,000	....	50 00
Manitoba	7	350	1,904,007	....	687,868	....	350 00
N. W. Territories	3	150	430,045	....	157,020	....	150 00
British Columbia	37	1,825	3,894,922	9,351	1,504,186	38,282	2,323 90
Totals	135	6,675	59,481,728	9,351	23,309,172	219,234	7,173 90

—	1899.	1900.
	Galls.	Galls.
Exported	6,854	4,969
Used by H. M. Army and Navy	209,306	214,265
Totals	216,160	219,234

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 12.—Return of Manufactures for the Year ended June 30, 1900.

Divisions.	Licenses.		Total weight of Raw Leaf Tobacco and other materials actually used.	Deficiency paying Duty.	Tobacco.			Cigarettes.			Canadian Tobacco.			Canadian Cigarettes.			Combination Tobacco.			Combination Cigarettes.		Snuff.					Total Duty collected Ex-Manufactory, including License Fees.
	No.	Fees.			At 25 cents per lb.	Paid Duty.	Warehoused	At $3 per M.	Paid Duty.	Warehoused	At 5 cents per lb.	Paid Duty.	Ware-housed.	At $1.50 per M.	Paid Duty.	Ware-housed.	At 5 cents per lb.	Paid Duty.	Ware-housed.	At $1.50 per M.	Paid Duty.	At 25 cents per lb.	Paid Duty.	At 18 cents per lb.	Paid Duty.	Ware-housed.	
		$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	No.	No.	No.	Lbs.	Lbs.	Lbs.	No.	No.	No.	Lbs.	Lbs.	Lbs.	No.	No.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
Hamilton, Ont.	1	75 00	887,538	20	881,252	125,260½	755,991½	137,372	137,372	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	31,807 24
Toronto, "	1	65 00	156,421	..	510	510	....	....	....	....	....	....	....	....	....	....	155,771½	33,521	122,250½	....	....	....	....	....	....	....	1,868 55
Windsor, "	2	75 00	130,369	...	....	....	....	....	....	....	128,780½	125,183½	3,597	....	....	....	....	....	....	....	....	....	....	....	....	....	6,334 19
Totals	4	215 00	1,174,328	20	881,762	125,770½	755,991½	137,372	137,372	....	128,780½	125,183½	3,597	....	....	....	155,771½	33,521	122,250½	....	....	....	....	....	....	....	40,009 98
[illegible]ette, Que.	3	140 00	432,357½	...	....	....	....	....	....	....	314,149	75,884½	238,264½	....	....	....	119,476½	35,061½	84,415	....	....	....	....	....	....	....	5,687 33
[illegible]ntreal, "	17	1,037 50	6,227,960½		5,525,450½	331,833½	5,193,617	104,027,100	102,943,700	1,083,400	514,596	460,481	54,115	1,824,000	349,000	1,475,000	163,969½	112,231	51,738½	72,100	72,100	5,500	5,500	126,400	126,000	400	446,149 29
[illegible]bec, "	7	440 00	637,934		100,273½	95,215	5,058½	9,983,100	8,307,400	1,675,700	406,176½	377,408½	28,768	....	....	....	72,240	72,240	....	....	....	1,337	1,337	86,500	86,590	....	87,552 51
[illegible] Hyacinthe, "	1	25 00	629	..	....	....	....	....	....	....	708¾	708¾	....	....	....	....	....	....	....	....	....	....	....	....	....	....	60 12
[illegible]rooke, "	2	115 00	1,678,512½		....	....	....	....	....	....	1,170,728	765,448	465,280	....	....	....	691,744	271,643	420,101	....	....	....	....	....	....	....	48,969 60
[illegible] Rivers, "	1	50 00	20,817		....	....	....	....	....	....	21,335	21,335	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,116 75
Totals.	31	1,807 50	8,998,210½	...	5,625,724	427,048½	5,198,675½	114,010,200	111,251,100	2,759,100	2,427,692⅞	1,641,265¼	786,427½	1,824,000	349,000	1,475,000	1,047,430	491,175½	556,254½	72,100	72,100	6,837	6,837	212,900	212,500	400	589,535 90
[illegible]n, N.B.	1	75 00	22,770	.....	3,203	3,061	142	7,223,400	1,867,900	5,355,500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6,143 95
[illegible] N.S.	2	140 00	4,195	....	673	248	425	....	....	....	....	....	....	....	....	....	3,631	3,631	....	....	....	....	....	....	....	....	383 55
[illegible] "	2	150 00	113,449	....	115,896	17,704	98,192	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4,576 00
Totals.	4	290 00	117,644	......	116,569	17,952	98,617	....	....	....	....	....	....	....	....	....	3,631	3,631	....	....	....	....	....	....	....	....	4,959 55
[illegible]ttetown, P.E.I	4	250 00	160,954	...	134,553	70,966	63,587	....	....	....	31,544	15,993	15,551	....	....	....	....	....	....	....	....	....	....	....	....	....	18,791 15
Grand totals	44	2,637 50	16,473,906½	20	6,761,811	644,798	6,117,013	121,370,972	113,256,372	8,114,600	2,588,017¼	1,782,441⅞	805,575½	1,824,000	349,000	1,475,000	1,206,832½	528,327½	678,505	72,100	72,100	6,837	6,837	212,900	212,500	400	659,740 53

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

DR. CR.

No. 13.—Comparative Statement of Manufactures for the Years ended June 30, 1899 and 1900.

Provinces.	Licenses.		Total weight of Raw Leaf Tobacco and other materials actually used.	Deficiency paying Duty	Tobacco.			Cigarettes.			Canadian Tobacco.			Canadian Cigarettes.			Combination Tobacco.			Combination Cigarettes.		Snuff.					Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.			At 25 cents per lb.	Paid Duty.	Warehoused	At $3 per M.	Paid Duty.	Warehoused	At 5c. per lb.	Paid Duty	Warehoused.	At $1.50 per M.	Paid Duty.	Warehoused.	At 5c. per lb.	Paid Duty.	Warehoused.	At $1.50 per M.	Paid Duty.	At 25c. per lb.	Paid Duty.	At 18c. per lb.	Paid Duty.	Warehoused.	
1899		$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	No.	No.	No.	Lbs.	Lbs.	Lbs.	No.	No.	No.	Lbs	Lbs	Lbs.	No.	No.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
Ontario	2	150 00	988,005		978,372	158,971½	819,400½	212,128	210,128	2,000																	40,523 29
Quebec	26	1,480 00	8,507,621		[illegible]974,733	452,768	5,521,965	98 717,100	96,806,600	1,910,500	2,190,523	1,562,566½	627,956½				382,092	263,906	118,186			6,005	6,005	212,220	212,220		536,116 29
New Brunswick	1	75 00	25,049		8,468	8,343	125	6,430,600	3,593,100	2,837,500																	12,940 05
Nova Scotia	3	225 00	109,245		112,349½	19,027½	93,322																				4,981 88
P. E. Island	3	175 00	172,272		174,252	80,877	93,375				3,340	1,600	1,740														20,474 25
Totals	35	2,105 00	9,802,172		7,248,174½	719,987	6,528,187½	105,359,828	100,609,828	4,750,000	2,193,863	1,564,166½	629,696½				382,092	263,906	118,186			6,005	6,005	212,220	212,220		615,035 76
1900																											
Ontario	4	215 00	1,174,328	20	[illegible]81,762	125,770½	755,991½	137,372	137,372		128,780½	125,183½	3,597				155,771½	33,521	122,250½								40,009 98
Quebec	31	1,807 50	8,998,210½		[illegible]625,724	427,048½	5,198,675½	114,010,200	111,251,100	2,759,100	2,427,692¼	1,641,265¼	786,427½	1,824,000	349,000	1,475,000	1,047,430	491,175½	556,254⅓	72,100	72,100	6,837	6,837	212,900	212,500	400	589,535 90
New Brunswick	1	75 00	22,770		3,203	3,061	142	7,223,400	1,867,900	5,355,500																	6,443 95
Nova Scotia	4	290 00	117,644		116,569	17,952	98,617										3,631	3,631									4,959 55
P. E. Island	4	250 00	160,954		134,553	70,966	63,587				31,544	15,993	15,551														18,791 15
Totals	44	2,637 50	10,473,906½	20	[illegible]761,811	644,798	6,117,013	121,370,972	113,256,372	8,114,600	2,588,017¼	1,782,441¾	805,675½	1,824,000	349,000	1,475,000	1,206,832½	528,327½	678,505	72,100	72,100	6,837	6,837	212,900	212,500	400	659,740 53

Inland Revenue Department,
Ottawa, September 22, 1900.

E. MIALL,
Commissioner.

Dr. Cr.

No. 14.—Warehouse Return for the Year ended June 30, 1900.

Remaining in Warehouse; Placed in Warehouse

Divisions	Remaining: Tobacco (Lbs)	Remaining: Cigarettes (No)	Remaining: Canadian Tobacco (Lbs)	Remaining: Combination Tobacco (Lbs)	Placed: Tobacco (Lbs)	Placed: Cigarettes (No)	Placed: Canadian Tobacco (Lbs)	Placed: Canadian Cigarettes (No)	Placed: Combination Tobacco (Lbs)	Placed: Snuff (Lbs)
Belleville, Ont	870									
Cornwall "	1,021½									
Guelph "	446½									
Hamilton "	290,151				755,991½					
Kingston "	3,148									
London "	6,962									
Ottawa "	14,661½									
Owen Sound "	6,879									
Perth "	2,309									
Port Arthur "	1,020									
St Catharines "	1,288									
Stratford "	102									
Toronto "	[illegible]								13,[illegible]	
Windsor "	1,052						3,597			
Totals	[illegible]				755,991½		3,597		13,[illegible]	
Joliette Que			39,915	20,132½			238,264½		[illegible]	
Montreal "	41,146½	25,000	13,238	650½	5,123,617	1,083,400	54,115	1,475,000	[illegible]	400
Quebec "	916½	5,000	3,406		5,058½	1,675,700	28,718			
Sherbrooke "	31		12,631	7,596			465,280		420,101	
Three Rivers "	14									
Totals	[illegible]	30,000	69,281	28,379	5,128,675½	2,759,100	786,427½	1,475,000	[illegible]	400
St. John, N B	[illegible]	635,400			142	5,355,600				
Halifax, N S	[illegible]				425					
Pictou "	[illegible]				98,192					
Totals	[illegible]				98,617					
Charlottetown, P E I	[illegible]		1,240		63,687		15,551			
Winnipeg, Man	[illegible]									
Calgary, N W T	[illegible]									
Vancouver, B.C	[illegible]									
Victoria "	[illegible]									
Totals	[illegible]									
Sundries	[illegible]									
Grand Totals	[illegible]	665,400	70,521	28,379	6,117,013	8,114,600	805,575½	1,475,000	675,505	400

Received from other Divisions; Totals to be Accounted for

Divisions	Received: Tobacco (Lbs)	Received: Cigarettes (No)	Received: Snuff (Lbs)	Totals: Tobacco (Lbs)	Totals: Cigarettes (No)	Totals: Canadian Tobacco (Lbs)	Totals: Canadian Cigarettes (No)	Totals: Combination Tobacco (Lbs)	Totals: Snuff (Lbs)
Belleville, Ont	11,618			12,488					
Cornwall "	12,204			13,825½					
Guelph "	36,715			37,061½					
Hamilton "	534,618			1,580,760½					
Kingston "	56,478			59,621					
London "	74,215½			81,177½					
Ottawa "	175,986½		400	190,648					400
Owen Sound "	158,618½			165,497½					
Perth "	48,772			50,791					
Port Arthur "	11,047			12,567					
St Catharines "	9,751			11,039					
Stratford "	19,128			19,530					
Toronto "	634,060½			700,722				122,[illegible]	
Windsor "	5,061			6,113		3,597			
Totals	1,788,1[illegible]		400	2,941,841½		3,597		122,[illegible]	400
Joliette Que						278,179½		104,[illegible]	
Montreal "	3,735	21,000		5,000,583½	1,129,400	67,353	1,475,000	52,[illegible]	400
Quebec "	24,856			41,961	1,680,700	32,264½			
Sherbrooke "	9,762			12,166		477,911		427,[illegible]	
Three Rivers "				644					
Totals	38,353	21,000		5,055,109½	2,810,100	855,708½	1,475,000	581,[illegible]	400
St. John, N B	342,[illegible]			350,095½	5,990,900				
Halifax, N S	366,792	31,000		442,184	31,000				
Pictou "	43,367			165,323					
Totals	410,159	31,000		607,507	31,000				
Charlottetown, P E I	231			85,449		16,791			
Winnipeg, Man	755,844½			822,921½					
Calgary, N W T	14,789			19,229					
Vancouver, B.C	253,309½			291,356½					
Victoria "	146,201			172,751					
Totals	399,510½			464,107½					
Sundries				19,719½					
Grand Totals	3,749,732	52,000	400	11,389,043	8,832,000	876,096½	1,475,000	706,[illegible]	800

Entered for Consumption

Divisions	Tobacco at 25c per lb. (Lbs)	Cigarettes at $3 per M (No.)	Canadian Tobacco cont 5c per lb (Lbs.)	Canadian Cigarettes at $1.50 per M (No)	Combination Tobacco at 5c. per lb (Lbs.)	Snuff at 18c per lb. (Lbs.)	Duty ($ cts)
Belleville, Ont	11,044						2,761 00
Cornwall "	13,825½						3,456 38
Guelph "	35,895						8,973 75
Hamilton "	761,288						190,321 99
Kingston "	57,582½						14,395 66
London "	75,242						18,810 50
Ottawa "	176,338					400	44,156 53
Owen Sound "	154,769½						38,692 38
Perth "	48,082						12,020 50
Port Arthur "	9,157						2,289 25
St Catharines "	9,563						2,390 75
Stratford "	19,153½						4,788 38
Toronto "	649,477				101,027½		167,420 61
Windsor "	6,113		3,467				1,701 60
Totals	2,027,580		3,467		101,027½	400	512,179 28
Joliette Que			227,910		72,027		14,996 93
Montreal "	2,261,499	590,350	41,889	200,000	40,408½		558,560 57
Quebec "	34,201½	1,586,700	13,825½				14,301 74
Sherbrooke "	11,482		371,677½		384,433		10,676 03
Three Rivers "	144						36 00
Totals	2,255,326½	2,177,050	661,302	200,000	496,868½		628,571 27
St. John, N B	350,747½	7,000					87,707 91
Halifax, N S	394,319½						98,580 00
Pictou "	51,847						12,961 75
Totals	446,166½						111,54[illegible] 84
Charlottetown, P E I	72,419		16,164				18,912 95
Winnipeg, Man	750,387						187,596 75
Calgary, N W T	17,051						4,262 75
Vancouver, B.C	239,047						59,761 78
Victoria "	145,112½						36,278 12
Totals	384,159½						96,039 90
Sundries							
Grand Totals	6,303,787	2,184,050	680,933	200,000	597,896	400	1,646,812 65

Removed in Bond to other Divisions; Exported; Army and Navy and Ships' Stores; Written off by Authority; Taken for Reworking

Divisions	Removed: Tobacco (Lbs.)	Removed: Cigarettes (No.)	Removed: Snuff (Lbs)	Exported: Tobacco (Lbs)	Exported: Cigarettes (No)	Exported: Canadian Tobacco (Lbs.)	Army and Navy: Tobacco (Lbs)	Army and Navy: Cigarettes (No)	Written off: Tobacco (Lbs)	Reworking: Tobacco (Lbs)	Reworking: Canadian Tobacco (Lbs)	Reworking: Combination Tobacco (Lbs)
Belleville, Ont												
Cornwall "												
Guelph "												
Hamilton "	512,805			30,910					[illegible]	2,458		
Kingston "	204											
London "												
Ottawa "												
Owen Sound "												
Perth "												
Port Arthur "												
St Catharines "												
Stratford "												
Toronto "	1,[illegible]										150	
Windsor "												
Totals	514,[illegible]			30,910					[illegible]	2,458	150	
Joliette Que											1,217	1,673
Montreal "	3,224,087	21,000	100	29,208	247,000	510	14,0[illegible]	[illegible]		35	3,299	2,904
Quebec "		10,000					30			44		
Sherbrooke "						340					4,301½	1,266
Three Rivers "	500											
Totals	3,224,587	31,000	100	29,208	247,000	850	14,3[illegible]	[illegible],000		79	8,817½	7,843
St. John, N B	554			142	5,391,000		4,[illegible]					
Halifax, N S		21,000		11,185			5,0[illegible]	[illegible],000				
Pictou "	231			80,831			1[illegible]			1,009		
Totals	231	21,000		92,016			5,17[illegible]	10,000		1,009		
Charlottetown, P E I	245						..			5,133		
Winnipeg, Man	672											
Calgary, N W T							.					
Vancouver, B.C	9,044			75			2[illegible]					
Victoria "				70			4,7[illegible]					
Totals	9,044			145			5,01[illegible]					
Sundries							..					
Grand Totals	3,749,7[illegible]2	52,000	400	152,421½	5,638,000	850	25,0[illegible]	[illegible]5,000	9,425½	8,679	8,947½	7,843

Remaining in Warehouse; Total Accounted for

Divisions	Remaining: Tobacco (Lbs.)	Remaining: Cigarettes (No)	[illegible]	[illegible]	[illegible]	Total Accounted for: [illegible]
Belleville, Ont	1,444					
Cornwall "						
Guelph "	1,166					
Hamilton "	266,871					
Kingston "	1,840					
London "	5,935½					
Ottawa "	14,210					
Owen Sound "	10,728					
Perth "	2,709					
Port Arthur "	3,110					
St Catharines "	1,47[illegible]					
Stratford "	[illegible]					
Toronto "	49,8[illegible]					
Windsor "						
Totals	357,11[illegible]					
Joliette Que						
Montreal "	[illegible]	[illegible]				
Quebec "	7,1[illegible]	[illegible]				
Sherbrooke "	[illegible]			41		
Three Rivers "						
Totals	[illegible]	[illegible]		[illegible]		
St. John, N B	21,2[illegible]	[illegible]				
Halifax, N S	[illegible]					
Pictou "	31,[illegible]					
Totals	62,908					
Charlottetown, P E I	7,652					
Winnipeg, Man	71,855					
Calgary, N W T	2,178					
Vancouver, B.C	[illegible]					
Victoria "	[illegible]					
Totals	[illegible]					
Sundries	19,719½					
Grand Totals	[illegible]	[illegible]		1,475,000	101,[illegible]	800

Inland Revenue Department,
Ottawa, September 22, 1900.

[illegible] MIALL,
Commissioner.

No. 15.—Comparative Statement of Warehouse Returns for the Years ended June 30, 1899 and 1900.

Dr. / Cr.

Dr. — Remaining in Warehouse; Placed in Warehouse

Provinces	Remaining: Tobacco (Lbs.)	Remaining: Cigarettes (No.)	Remaining: Canadian Tobacco (Lbs.)	Remaining: Canadian Cigarettes (No.)	Remaining: Combination Tobacco (Lbs.)	Placed: Tobacco (Lbs.)	Placed: Cigarettes (No.)	Placed: Canadian Tobacco (Lbs.)	Placed: Canadian Cigarettes (No.)	Placed: Combination Tobacco (Lbs.)	Placed: Snuff (Lbs.)
1899											
Ontario	[illegible]					[illegible]	2,000				
Quebec	[illegible]		[illegible]	[illegible]		21,965	1,910,500	[illegible]		118,186	
New Brunswick	[illegible]	[illegible]				125	2,837,500				
Nova Scotia	[illegible]					[illegible]					
P. E. Island	[illegible]					[illegible]		[illegible]			
Manitoba	[illegible]										
N. W. Territories	[illegible]										
British Columbia	[illegible]										
Sundries	[illegible]										
Totals	[illegible]	[illegible]		[illegible]		[illegible]	4,750,000			118,186	
1900											
Ontario	[illegible]					[illegible]				122,250	
Quebec	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	2,759,100		[illegible]	556,254½	400
New Brunswick	[illegible]	[illegible]				112	5,355,500				
Nova Scotia						[illegible]					
P. E. Island	[illegible]					[illegible]					
Manitoba											
N. W. Territories											
British Columbia											
Sundries											
Totals	[illegible]	[illegible]	[illegible]		[illegible]	[illegible] 117,013	8,114,600		[illegible]	678,505	400

Dr. — Received from other Divisions; Totals to be accounted for

Provinces	Received: Tobacco (Lbs.)	Received: Cigarettes (No.)	Received: Snuff (Lbs.)	Totals: Tobacco (Lbs.)	Totals: Cigarettes (No.)	Totals: Canadian Tobacco (Lbs.)	Totals: Canadian Cigarettes (No.)	Totals: Combination Tobacco (Lbs.)	Totals: Snuff (Lbs.)
1899									
Ontario	1,711,783			2,908,658½	2,000				
Quebec	68,170	146,000		6,472,970	2,056,500	697,194½	392,500	118,186	
New Brunswick	379,861			410,304½	3,416,400				
Nova Scotia	411,546	70,000		614,505½	70,000				
P. E. Island	7,15½			105,492½		1,740			
Manitoba	657,[illegible]13			742,533					
N. W. Territories	10,300			14,490					
British Columbia	348,448½			449,170					
Sundries				19,719½					
Totals	3,588,566	216,000		11,637,843½	5,544,900	698,934½	392,500	118,186	
1900									
Ontario	1,788,1[illegible]		400	2,941,841½		3,597		122,250	400
Quebec	38,413	21,000		6,055,169½	2,810,100	[illegible],708½	1,475,000	584,633½	400
New Brunswick	312,592			373,095½	5,990,000				
Nova Scotia	410,159	31,000		607,507	31,000				
P. E. Island	231			85,449		[illegible]791			
Manitoba	755,814½			822,924½					
N. W. Territories	14,789			19,229					
British Columbia	399,510½			464,107½					
Sundries				19,719½					
Totals	3,719,732	52,000	400	11,389,043	8,832,000	[illegible]096½	1,475,000	706,884	800

Cr. — Entered for Consumption

Provinces	Tobacco at 25c. per lb. (Lbs.)	Cigarettes at $3 per M (No.)	Canadian Tobacco at 5c. per lb. (Lbs.)	Canadian Cigarettes at $1.50 per M (No.)	Combination Tobacco at 5c. per lb. (Lbs.)	Snuff at 12c. per lb. (Lbs.)	Duty ($ cts.)
1899							
Ontario	1,993,0[illegible]						498,277 58
Quebec	2,440,608	120,000	621,760	392,500	88,299	..	648,103 90
New Brunswick	379,150	21,000					94,850 40
Nova Scotia	426,868						106,717 23
P. E. Island	76,801½		500				19,251 12
Manitoba	675,117						168,779 31
N. W. Territories	10,050						2,512 51
British Columbia	378,032						94,508 02
Sundries							
Totals	6,385,799½	141,000	[illegible]260	392,500	88,299		1,633,000 25
1900							
Ontario	2,027,530		467		101,027½	400	512,179 28
Quebec	2,255,[illegible]26½	2,177,[illegible]	[illegible]302	200,000	496,808½		628,671 27
New Brunswick	350,747½	7,[illegible]					87,716 91
Nova Scotia	440,166						111,741 84
P. E. Island	72,119		[illegible]164				18,912 95
Manitoba	750,987						187,786 75
N. W. Territories	17,054						4,262 75
British Columbia	384,1[illegible]½						96,039 90
Sundries							
Totals	6,703,787	2,1[illegible]	[illegible]933	[illegible]00,000	597,836	400	1,6[illegible]6,812 65

Cr. — Removed in Bond to other Divisions; Exported; Army and Navy and Ships' Stores; Written off by Authority

Provinces	Removed: Tobacco (Lbs.)	Removed: Cigarettes (No.)	Removed: Snuff (Lbs.)	Exported: Tobacco (Lbs.)	Exported: Cigarettes (No.)	Exported: Canadian Tobacco (Lbs.)	Army and Navy: Tobacco (Lbs.)	Army and Navy: Cigarettes (No.)	Written off: Tobacco (Lbs.)
1899									
Ontario	475,770½			32,580	2,000				124½
Quebec	3,092,948	91,000		14,808½	1[illegible]400	19		21,000	
New Brunswick		125,000		125	2[illegible],000		668		
Nova Scotia	10,892½			75,615½			2,598½	70,000	
P. E. Island	3,349								
Manitoba	3,3[illegible]								
N. W. Territories									
British Columbia	5,477						1,066		
Sundries									
Totals	3,588,566	216,000		123,129	[illegible]	19	4,332½	91,000	124½
1900									
Ontario	514,399			30,910					9,42[illegible]
Quebec	3,224,587	31,000	400	29,208	17,000	[illegible]50	14,[illegible]½	55,000	
New Brunswick	554			142	[illegible]		4.6[illegible]		
Nova Scotia	231	21,000		92,016½			5,175	10,000	
P. E. Island	245								
Manitoba	672								
N. W. Territories									
British Columbia	9,044			145			5,014[illegible]		
Sundries									
Totals	3,749,732	52,000	400	152,421½	[illegible]8,000	[illegible]50	25,014½	65,000	9,425½

Cr. — Taken for Re-working; Remaining in Warehouse

Provinces	Re-working: Tobacco (Lbs.)	Re-working: Canadian Tobacco (Lbs.)	Re-working: Combination Tobacco (Lbs.)	Remaining: Tobacco (Lbs.)	Remaining: Cigarettes (No.)	Remaining: Canadian Tobacco (Lbs.)	Remaining: Canadian Cigarettes (No.)	Remaining: Combination Tobacco (Lbs.)
1899								
Ontario	9,457			397,657				
Quebec	729	6,144½	1,508	818,081	30,000	69[illegible]		28,379
New Brunswick				30,363½	635,400			
Nova Scotia				98,731				
P. E. Island	3,608			21,631		1,[illegible]40		
Manitoba				67,080				
N. W. Territories				4,440				
British Columbia				64,597				
Sundries				19,719½				
Totals	13,594	6,144½	1,508	1,522,298	665,400	70[illegible]		28,379
1900								
Ontario	2,458	130		357,119				21,223
Quebec	79	8,817½	7,843	531,580½	300,050	184	1,275,000	79,922
New Brunswick				21,216	592,900			
Nova Scotia	1,000			62,908½				
P. E. Island	5,1[illegible]			7,052		[illegible]		
Manitoba				71,865½				
N. W. Territories				2,178				
British Columbia				65,744½				
Sundries				19,719½				
Totals	8,679	8,947½	7,843	1,139,983½	892,950	185	1,275,000	101,145

Cr. — Total Accounted for

Provinces	Tobacco (Lbs.)	Cigarettes (No.)	Canadian Tobacco (Lbs.)	Canadian Cigarettes (No.)	Combination Tobacco (Lbs.)	Snuff (Lbs.)
1899						
Ontario	2,908,658½	2,000				
Quebec	6,472,970	2,056,500	697,194½	392,500	118,186	
New Brunswick	410,304½	3,416,400				
Nova Scotia	614,505½	70,000				
P. E. Island	103,492½		1,740			
Manitoba	742,533					
N. W. Territories	14,490					
British Columbia	449,170					
Sundries	19,719½					
Totals	11,637,843½	5,544,900	698,934½	392,500	118,186	
1900						
Ontario	2,941,841½		3,597		122,250	400
Quebec	6,055,169½	2,810,100	855,708½	1,475,000	584,633½	400
New Brunswick	373,095½	5,990,900				
Nova Scotia	607,507	31,000				
P. E. Island	85,449		16,791			
Manitoba	822,924½					
N. W. Territories	19,229					
British Columbia	464,107½					
Sundries	19,719½					
Totals	11,389,043	8,832,000	876,096½	1,475,000	706,884	800

	1899	1900
Total duty collected ex-manufactory and ex warehouse on tobacco, including Canada Twist and Raw Leaf	$3,317,793 17	$3,278,838 98
Total duty collected on licenses	2,375 00	2,800 50
Totals	$3,320,168 17	$3,281,639 48

[illegible] [illegible]ober 22, 1900.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—RAW LEAF TOBACCO, INCLUDING STEMS SCRAPS AND CUTTINGS.

Dr. No. 16.—Warehouse Return for the Year ended June 30, 1900. Cr.

Remaining in Warehouse from last Year.	Placed in Warehouse.	Received from other Divisions.	Totals.	Divisions.	Entered for Duty. Quantity.	Entered for Duty. Duty.	Removed in Bond to other Divisions.	Exported.	Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse.	Totals.
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.		Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
600	2,253	142	2,995	Belleville, Ont.	2,571	257 10	......	......	......	......	......	421	2,995
28,346	64,189	1,737	94,272	Brantford "	71,847	7,197 90	1,351	5,710	......	23	1,029	14,312	94,272
29,911	77,901	6,631	114,443	Guelph "	84,018	8,401 80	......	2,682	......	......	2,642	25,101	114,443
753,464	1,481,669	6,038¼	2,241,171¼	Hamilton "	1,113,420	111,355 76	1,232	139,474	32	......	504	983,509¼	2,241,171¼
72,851	63,803	1,294	137,948	Kingston "	68,969	6,900 02	6,194	726	......	......	318	61,741	137,948
183,112	524,046	2,819	709,977	London "	179,094	18,577 92	7,196	46,927	......	......	148	176,012	709,977
1,684	3,451	10,352½	15,487½	Ottawa "	1,103½	110 35	......	......	......	9,458	250	1,676	15,487½
958	8,625	......	9,583	Owen Sound "	8,177	817 70	......	......	......	......	147	959	9,583
804	455	......	1,259	Perth "	702	70 20	......	......	......	......	......	557	1,259
260	1,672	736	2,668	Peterborough "	1,598	159 80	......	......	......	736	......	334	2,668
5,184	11,191	3,976	20,351	Prescott "	14,457	1,471 94	2,960	......	136	29	......	2,769	20,351
26,294	22,600	580	49,474	St. Catharines "	23,110½	2,317 37	4,021	6,206½	......	......	......	15,806	49,474
12,074	42,071	103	54,248	Stratford "	35,684	3,568 40	......	4,481	......	......	......	14,083	54,248
113,391	223,194	11,563½	348,148½	Toronto "	196,215	25,556 14	3,998½	22,800	200	163½	1,301	123,167½	348,148½
10,725	33,869	2,401	46,995	Windsor "	29,792	2,984 00	696	4,893	......	......	890	10,724	46,995
1,239,655	2,560,992	48,373¾	3,849,020¼	Totals...	2,134,088	220,076 70	39,918½	233,899½	368	10,709½	7,832	1,431,174¾	3,849,020¼
31,092	31,459	1,860	64,411	Joliette, Que.	13,251	4,055 38	8,445	......	......	......	......	42,715	64,411
4,261,848¼	6,144,150¾	15,711½	10,421,710½	Montreal "	6,298,011¼	639,614 42	70,676	123,158¼	15,296	211	93,058½	3,821,299½	10,421,710½
57,285	189,695¾	37,542½	284,523¾	Quebec "	183,472¼	20,431 49	501	......	......	1,495	32,219	66,836	284,523¾
......	......	448	448	St. Hyacinthe "	......	......	......	......	......	448	......	......	448
149,775	200,336½	4,020	354,131½	Sherbrooke "	191,910	33,553 02	4,358½	10,214	604	......	727	146,318	354,131½
6,794	16,664	4,913½	28,371½	Three Rivers "	18,289½	1,828 96	5,877	......	......	......	488	3,717	28,371½
1,040	55,112	11,815	67,997	Victoriaville "	23,462	2,346 20	1,040	......	......	......	2,364	41,131	67,997
4,507,834¼	6,637,448	76,310½	11,221,592¾	..... Totals..	6,728,396	701,829 47	90,897½	133,372¼	15,900	2,154	128,856½	4,122,016½	11,221,592¾

21,893	42,016	2,445	66,354	St. John, N.B. ..	44,152	4,905 60	1,146	......	10	550	824	19,672	66,354
8,387½	11,273	2,358	22,018½	Halifax, N.S....	11,152	1,164 34	....	....	930	......	260	9,676½	22,018½
66,896	46,783	....	113,679	Pictou "	103,567	10,356 70	....	....	....	27	....	10,085	113,679
75,283½	58,056	2,358	135,697½	......Totals......	114,719	11,521 04	....	....	930	27	260	19,761½	135,697½
84,587	96,867	....	181,454	Charlottetown, P.E.I.	125,510	12,551 00	......	....	....	....	....	55,944	181,454
32,936	131,416¼	291¾	164,644	Winnipeg, Man...	103,518	10,351 80	5,556	7,581	....	....	....	47,989	164,644
32,425	64,003	2½	96,430½	Vancouver, B.C. .	68,723	7,399 09	1,338	3,061	....	....	....	23,308½	96,430½
3,257	40,962	105	44,324	Victoria " ..	33,429	3,342 90	....	3,719	....	....	....	7,176	44,324
35,682	104,965	107½	140,754½	..... Totals ..	102.152	10,741 99	1,338	6,780	....	......	....	30,484½	140,754½
5,997,870¾	9,631,760¼	129,886	15,759,517	..Grand Totals...	9,352,535	971,977 60	129,886	381,632¾	17,208	13,440½	137,772½	5,727,042¼	15,759,517

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX A—*Continued*—RAW LEAF TOBACCO, INCLUDING STEMS, SCRAPS AND CUTTINGS.

DR. No. 17—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended June 30, 1899 and 1900. CR.

Remaining in Warehouse from last year.	Placed in Warehouse.	Received from other Divisions.	Totals.	Provinces.	Entered for Duty.		Removed to other Divisions.	Exported.	Free and Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse.	Totals.
					Quantity.	Duty.							
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	1899.	Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
393,026	3,194,538	104,841½	3,692,406½	Ontario	2,098,451¾	210,616 97	31,292	233,987½	399	79,501	9,120¼	1,239,655	3,692,406½
2,268,976½	10,577,144	81,083½	12,927,204	Quebec	7,641,395	806,653 17	152,732¼	245,268½	259,540	3,011	117,453	4,507,834¼	12,927,204
7,305	70,210	396	77,911	New Brunswick	15,034	4,503 10	787	1,645	8	8,544	....	21,893	77,911
9,696	182,097	3,601	195,394	Nova Scotia	115,953½	11,599 59	2,338	325	518	....	981	75,283½	195,394
9,019	241,322		250,341	P. E. Island	165,754	16,654 20	....	....	....	....	....	84,587	250,341
5,269	123,744	700	129,713	Manitoba	80,031	8,010 90	5,931	9,937	758	117	....	32,936	129,713
10,345	126,260	2,629¼	139,234¼	B. Columbia	93,243¾	9,617 87	168	630½	9,497	....	13	35,682	139,234¼
2,703,636½	14,515,316	193,251¼	17,412,203¾	Totals	10,239,863	1,067,656 40	193,251¼	491,793½	270,685	91,173	127,567¼	5,997,870¾	17,412,203¾
				1900.									
1,239,655	2,560,992	48,373¼	3,849,020¼	Ontario	2,134,088	220,076 70	30,918½	233,899½	368	10,709½	7,832	1,431,174¾	3,849,020¼
4,507,834¼	6,637,448	76,310½	11,221,592¾	Quebec	6,728,396	701,829 47	90,897½	133,372¼	15,900	2,154	128,856½	4,122,016½	11,221,592¾
21,893	42,016	2,445	66,354	New Brunswick	44,152	4,905 60	1,146	....	10	550	824	19,672	66,354
75,283½	58,056	2,358	135,697½	Nova Scotia	114,719	11,521 04	....	....	930	27	260	19,761½	135,697½
84,587	96,867	....	181,454	P. E. Island	125,510	12,551 00	....	....	....	....	....	55,944	181,454
32,936	131,416¼	291¾	164,644	Manitoba	103,518	10,351 80	5,556	7,581	....	....	....	47,989	164,644
35,682	104,965	107½	140,754½	B. Columbia	102,152	10,741 99	1,338	6,780	....	....	....	30,484½	140,754½
5,997,870¾	9,631,760¼	129,886	15,759,517	Totals	9,352,535	971,977 60	129,886	381,632¾	17,208	13,440½	137,772½	5,727,042¼	15,759,517

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX A—*Continued*—CANADA TWIST TOBACCO.

No. 18.—Statement of Revenue collected for the Year ended June 30, 1900.

Divisions.	Licenses. No.	Licenses. Fees.	Canada Twist, at 5c. per lb.	Duty collected, including License Fees.
		$	Lbs.	$ cts.
Belleville Ont	1	2	120	8 00
Cornwall "	3	6	3,095	160 75
Ottawa "	11	21	4,846	263 30
Prescott "	1	2	200	12 00
Totals	16	31	8,261	444 05
Joliette, Que	8	14	9,630	495 50
Montreal "	58	116	40,948	2,163 40
Sorel "	1	2	75	5 75
Totals	67	132	50,653	2,664 65
Grand Totals	83	163	58,914	3,108 70

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

CANADA TWIST TOBACCO.

No. 19.—Comparative Statement for Years ended June 30, 1899 and 1900.

Years.	Provinces.	Licenses. No.	Licenses. Fees.	Canada Twist, at 5c. per lb.	Duty collected, including License Fees.
			$	Lbs.	$ cts.
1899	Ontario	29	56	$11,567\frac{1}{2}$	634 38
	Quebec	111	214	$72,547\frac{1}{2}$	3,841 38
	Totals	140	270	84,115	4,475 76
1900	Ontario	16	31	8,261	444 05
	Quebec	67	132	50,653	2,664 65
	Totals	83	163	58,914	3,108 70

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX *A—Continued*—CIGARS.

No. 20.—Return of Manufactures

Divisions.	Licenses.		Total weight of Raw Leaf Tobacco and all other material actually used.	Deficiencies paying duty.	Cigars at $7 per Thousand.			Cigars
	No.	Fees.			Produced.	Paid Duty.	Warehoused.	Produced.
		$ cts.	Lbs.	No.	No.	No.	No.	No.
Belleville, Ont.	1	75 00	2,895	....	....	....	....	165,050
Brantford "	8	600 00	67,901	....	....	....	....	3,799,185
Guelph "	12	900 00	85,725	....	1,200	....	1,200	5,459,595
Hamilton "	14	1,012 50	115,125	....	1,500	1,500	....	6,722,795
Kingston "	2	150 00	67,471	....	....	....	....	4,047,550
London "	22	1,650 00	446,357	....	....	....	....	27,506,470
Ottawa "	1	75 00	4,734½	....	4,200	4,200	....	233,350
Owen Sound "	2	150 00	8,097	....	....	....	....	467,500
Perth "	1	75 00	721½	....	....	....	....	45,340
Peterborough, Ont.	1	75 00	1,451	....	....	....	....	105,650
Prescott "	4	262 50	14,074	....	....	....	....	780,350
St. Catharines "	9	675 00	20,417½	....	....	....	....	1,242,100
Stratford "	3	225 00	32,916	50	....	....	....	1,732,370
Toronto "	20	1,500 00	145,982	....	....	....	....	8,268,540
Windsor "	5	337 50	27,769	....	300	300	....	1,624,550
Totals	105	7,762 50	1,041,636½	50	7,200	6,000	1,200	62,200,395
Joliette, Que	1	25 00	2,258	....	....	....	....	....
Montreal "	35	2,455 00	956,038 7/10	8,380	690	690	....	47,381,770
Quebec "	6	425 00	66,640¼	....	....	....	....	3,850,530
St. Hyacinthe, Que.	3	100 00	8,593	....	....	....	....	....
Sherbrooke, Que.	6	400 00	130,507½	....	....	....	....	6,569,570
Three Rivers "	4	275 00	24,549½	....	....	....	....	1,219,580
Victoriaville "	1	75 00	21,080	....	....	....	....	1,083,800
Totals	56	3,755 00	1,209,666 19/20	8,380	690	690	....	60,105,250
St. John, N.B.	4	247 50	36,782	....	....	....	....	765,850
Halifax, N.S.	3	225 00	10,435	....	....	....	....	615,360
Winnipeg, Man.	7	525 00	92,686	....	....	....	....	5,214,145
Vancouver, B.C.	10	740 00	64,334	....	2,202	2,202	....	3,147,825
Victoria "	11	775 00	30,036	....	....	....	....	1,548,750
Totals	21	1,515 00	94,370	....	2,202	2,202	....	4,696,575
Grand totals	196	14,030 00	2,485,576 9/20	8,430	10,092	8,892	1,200	133,597,575

Inland Revenue Department,
Ottawa, September 22, 1900.

for the Year ended June 30, 1900.

at $6 per Thousand.		Canadian Cigars at $3 per Thousand.			Combination Cigars at $3 per Thousand.			Total Duty Collected ex-Manufactory, including License Fees.
Paid Duty.	Warehoused	Produced.	Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
99,700	65,350	....	....	....	....	....	....	673 20
2,602,560	1,196,625	....	....	....	....	....	....	16,215 36
2,142,845	3,316,750	....	....	....	....	....	....	13,757 07
3,106,590	3,616,205	....	....	....	....	....	....	19,662 54
1,631,000	2,416,550	....	....	....	....	....	....	9,936 00
16,824,040	10,682,430	....	....	....	....	....	....	102,594 24
233,350	....	....	....	....	....	....	....	1,504 50
169,700	297,800	....	....	....	....	....	....	1,168 20
12,040	33,300	....	....	....	....	....	....	147 24
86,500	19,150	....	....	....	....	....	....	594 00
539,400	240,950	....	....	....	....	....	....	3,498 90
1,174,300	67,800	....	....	....	....	....	....	7,720 80
1,576,020	156,350	....	....	....	....	....	....	9,681 42
5,550,670	2,717,870	....	....	....	....	....	....	34,804 02
987,600	636,950	....	....	....	....	....	....	6,265 20
36,736,315	25,464,080	....	....	....	....	....	....	228,222 69
....	....	80,000	80,000	....	....	....	....	265 00
22,206,535	25,175,235	....	....	....	2,652,070	1,939,370	712,700	141,567 45
1,143,305	2,707,225	122,700	122,700	....	....	....	....	7,652 93
....	....	505,250	337,500	117,750	....	....	....	1,262 51
3,340,280	3,229,290	713,890	538,190	175,700	....	....	....	22,056 25
582,225	637,355	117,500	106,500	11,000	....	....	....	4,087 85
618,875	464,925	....	....	....	....	....	....	3,788 25
27,891,220	32,214,030	1,539,340	1,234,890	304,450	2,652,070	1,939,370	712,700	180,680 24
207,100	558,750	....	....	....	1,169,450	195,900	973,550	2,077 80
278,860	336,500	....	....	....	....	....	....	1,898 16
1,395,745	3,818,400	....	....	....	....	....	....	8,899 47
2,929,025	218,800	....	....	....	399,250	399,250	....	19,527 32
1,237,775	310,975	21,700	21,700	....	....	....	....	8,266 75
4,166,800	529,775	21,700	21,700	....	399,250	399,250	....	27,794 07
70,676,040	62,921,535	1,561,040	1,256,590	304,450	4,220,770	2,534,520	1,686,250	449,572 43

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—CIGARS.

DR. No. 21.—COMPARATIVE STATEMENT of Manufactures

Provinces.	Licenses.		Total weight of Raw Leaf Tobacco and all other materials actually used.	Deficiencies paying Duty.	Cigars at $7 per Thousand.			Cigars
	No.	Fees.			Produced.	Paid Duty.	Warehoused.	Produced.
1899.		$ cts.	Lbs.	No.	No.	No.	No.	No.
Ontario..........	101	7,200 00	959,225¼	4,700	3,222	3,222	....	56,021,745
Quebec.....	49	3,382 50	1,264,680⅕	4,406	8,400	8,400	....	65,435,740
New Brunswick...	2	150 00	20,200	....	....	....	....	1,283,345
Nova Scotia	3	225 00	11,000	....	....	....	....	639,100
Manitoba.	6	412 50	72,484	....	....	....	....	3,965,250
British Columbia .	20	1,452 50	76,626	....	....	....	....	4,000,225
Totals.......	181	12,822 50	2,404,215 9/20	9,106	11,622	11,622	....	131,345,405
1900.								
Ontario......... .	105	7,762 50	1,041,636½	50	7,200	6,000	1,200	62,200,395
Quebec.	56	3,755 00	1,209,666 13/20	8,380	690	690	....	60,105,250
New Brunswick..	4	247 50	36,782	....	....	....	....	765,850
Nova Scotia	3	225 00	10,435	....	....	....	....	615,360
Manitoba.	7	525 00	92,686	....	....	....	....	5,214,145
British Columbia..	21	1,515 00	94,370	....	2,202	2,202	....	4,696,575
Totals.......	196	14,030 00	2,485,576 3/20	8,430	10,092	8,892	1,200	133,597,575

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

for the Years ended June 30, 1899 and 1900. Cr.

at $6 per Thousand.		Canadian Cigars at $3 per Thousand.			Combination Cigars at $3 per Thousand.			Total Duty collected ex-Manufactory including License Fees.
Paid Duty.	Warehoused	Produced.	Paid Duty	Warehoused.	Produced.	Paid Duty	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
33,165,395	22,856,350	....	....	....	....	....	....	206,243 13
33,299,455	32,136,285	979,250	775,750	203,500	626,220	353,220	273,000	206,651 38
333,895	949,450	....	....	....	....	....	....	2,153 37
252,650	386,450	....	....	....	....	....	....	1,740 90
1,017,275	2,947,975	....	....	....	....	....	....	6,516 15
3,575,475	424,750	....	....	....	171,625	171,625	....	23,420 23
71,644,145	59,701,260	979,250	775,750	203,500	797,845	524,845	273,000	446,725 16
36,736,315	25,464,080	....	....	....	....	....	....	228,222 69
27,891,220	32,214,030	1,539,340	1,234,890	304,450	2,652,070	1,939,370	712,700	180,680 24
207,100	558,750	....	....	....	1,169,450	195,900	973,550	2,077 80
278,860	336,500	....	....	....	....	....	....	1,898 16
1,395,745	3,818,400	....	....	....	....	....	....	8,899 47
4,166,800	529,775	21,700	21,700	....	399,250	399,250	....	27,794 07
70,676,040	62,921,535	1,561,040	1,256,590	304,450	4,220,770	2,534,520	1,686,250	449,572 43

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—CIGARS.

Dr. No. 22.—Warehouse Return for the Year ended June 30, 1900. Cr.

Remaining in Warehouse from last year.			Placed in Warehouse.			Received from other Divisions.	Total Number to be Accounted for.			Divisions.	Entered for Consumption.				Removed in bond to other Divisions.	Exported.		Taken for Re-working.	Remaining in Warehouse.			Total Number accounted for.		
Foreign.	Canadian.	Combination.	Foreign.	Canadian	Combination.	Foreign.	Foreign.	Canadian.	Combination.		Foreign at $6 p. M.	Canadian at $3 p. M.	Combination at $6 p. M.	Duty	Foreign.	Foreign.	Combination	Foreign.	Foreign.	Canadian.	Combination	Foreign.	Canadian	Combination.
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.	$ cts	No	No.	No.	No.	No.	No.	No.	No.	No.	No
15,700			65,350				81,050			Belleville, Ont.	31,050			186 30	50,000							81,050		
484,325			1,196,625			10,000	1,690,950			Brantford "	1,132,000			6,792 00	20,000				538,950			1,690,950		
378,225			*1,200 3,316,750			12,000	3,708,175			Guelph "	*1,200 3,260,575			8 40 19,563 45	15,000				431,400			3,708,175		
614,285			3,616,205				4,230,490			Hamilton "	3,016,750			18,100 50		975			1,212,765			4,230,490		
730,900			2,416,550				3,147,450			Kingston "	2,471,750			14,830 50					675,700			3,147,450		
2,263,195			10,682,430				12,945,625			London "	10,204,090			61,224 54	20,000	1,000			2,720,535			12,945,625		
115,000						88,500	203,500			Ottawa "	93,000			558 00					110,500			203,500		
71,650			297,800				369,450			Owen Sound "	254,000			1,524 00					115,450			369,450		
306,355	92,600		33,300				339,655	92,600		Perth "	126,100	29,000		813 60					213,555	63,600		339,655	92,600	
8,000			19,150				27,150			Peterborough "	10,000			60 00					17,150			27,150		
63,700			240,950				304,650			Prescott "	237,700			1,426 20					66,950			304,650		
88,950			67,800				156,750			St. Catharines "	139,750			838 50					17,000			156,750		
28,600			156,350				184,950			Stratford "	157,350			944 10					27,600			184,950		
504,450			2,717,870			90,000	3,312,320			Toronto "	2,543,180			15,259 08	179,500				589,640			3,312,320		
126,350			636,950				763,300			Windsor "	461,100			2,766 60					302,200			763,300		
5,799,685	92,600		*1,200 25,464,080			200,500	31,465,465	92,600		Totals	*1,200 24,138,395	29,000		144,925 77	284,500	1,975			7,039,395	63,600		31,465,465	92,600	
6,121,695		140,000	25,175,235		712,700		31,296,930		852,700	Montreal, Que.	25,389,530		625,000	154,212 18	228,910	87,125	22,700		5,591,365		205,000	31,296,930		852,700
476,935			2,707,225				3,184,160			Quebec "	2,540,565			15,243 39		4,000			639,595			3,184,160		
				117,750				117,750		St. Hyacinthe "		117,750		353 25									117,750	
986,795	96,100		3,229,290	175,700			4,216,085	271,800		Sherbrooke "	3,291,640	271,800		20,565 24	15,000				909,445			4,216,085	271,800	
143,400			637,355	11,000			780,755	11,000		Three Rivers "	594,300	11,000		3,598 80					186,455			780,755	11,000	
122,500			464,925			196,410	783,835			Victoriaville "	450,455			2,702 73	88,500			17,300	227,580			783,835		
7,851,325	96,100	140,000	32,214,030	304,450	712,700	196,410	40,261,765	400,550	852,700	Totals	32,266,490	400,550	625,000	196,675 59	332,410	91,125	22,700	17,300	7,554,440		205,000	40,261,765	400,550	852,700
756,200			558,750		973,550		1,314,950		973,550	St. John, N.B.	845,700		703,500	7,184 70		54,375			414,875		270,050	1,314,950		973,550
175,700			336,500			2,500	514,700			Halifax, N.S.	403,700			2,422 20		2,500			108,500			514,700		
583,175			3,818,400				4,401,575			Winnipeg, Man.	3,406,925			20,441 55					994,650			4,401,575		
118,400			218,800			217,500	554,700			Vancouver, B.C.	480,300			2,881 80					74,400			554,700		
163,050			310,975				474,025			Victoria "	256,475			1,538 85		17,300			200,250			474,025		
281,450			529,775			217,500	1,028,725			Totals	736,775			4,420 65		17,300			274,650			1,028,725		
15,447,535	188,700	140,000	*1,200 62,921,535	304,450	1,686,250	616,910	78,987,180	493,150	1,826,250	Grand Totals	*1,200 61,797,985	429,550	1,328,500	376,070 46	616,910	167,275	22,700	17,300	16,386,510	63,600	475,050	78,987,180	493,150	1,826,250

*1,200 cigars at $7 per M.

Inland Revenue Department,
Ottawa, September 22, 1900.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—CIGARS.

DR. CR.

No. 23.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended June 30, 1899 and 1900.

Remaining in Warehouse from last year.			Placed in Warehouse.			Received from other Divisions.	Total Number to be Accounted for.			Provinces.	Entered for Consumption.				Removed in Bond to other Divisions.	Exported.		Taken for re-working.	Remaining in Warehouse.			Total Number Accounted for.		
Foreign.	Canadian	Combination.	Foreign.	Canadian	Combination.	Foreign.	Foreign.	Canadian.	Combination.		Foreign at $6 p. M.	Canadian at $3 p. M.	Combination at $3 p. M.	Duty.	Foreign.	Foreign.	Combination.	Foreign.	Foreign.	Canadian.	Combination.	Foreign.	Canadian.	Combination.
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	1899.	No.	No.	No.	$ cts.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
5,441,890	231,100		22,856,350			342,000	28,640,240	231,100		Ontario	22,447,205	138,500		135,098 73	378,350	15,000			5,799,685	92,600		28,640,240	231,100	
4,433,940			32,136,285	203,500	273,000	74,225	36,644,450	203,500	273,000	Quebec	28,441,300	107,400	130,000	171,360 00	291,725	60,100	3,000		7,851,325	96,100	140,000	36,644,450	203,500	273,000
907,850			949,450				1,857,300			New Brunswick	1,098,100			6,588 60		3,000			756,200			1,857,300		
71,700			386,450			10,000	468,150			Nova Scotia	291,450			1,748 70		1,000			175,700			468,150		
351,975			2,947,975				3,302,950			Manitoba	2,719,775			16,318 65					583,175			3,302,950		
198,900			424,750			293,850	917,500			British Columbia	579,900			3,479 40	50,000	6,150			281,450			917,500		
11,406,255	231,100		59,701,260	203,500	273,000	720,075	71,830,590	434,600	273,000	Totals	55,577,730	245,900	130,000	334,594 08	720,075	85,250	3,000		15,447,535	188,700	140,000	71,830,590	434,600	273,000
										1900.														
5,799,685	92,600		*1,200 25,464,080			200,500	31,465,465	92,600		Ontario	*1,200 24,138,395	29,000		144,925 77	284,500	1,975			7,039,395	63,600		31,465,465	92,600	
7,851,325	96,100	140,000	32,214,030	304,450	712,700	196,410	40,261,765	400,550	852,700	Quebec	32,266,490	400,550	625,000	196,675 59	332,410	91,125	22,700	17,300	7,554,440		205,000	40,261,765	400,550	852,700
756,200			558,750		973,550		1,314,950		973,550	New Brunswick	845,700		703,500	7,184 70		54,375			414,875		270,050	1,314,950		973,550
175,700			336,500			2,500	514,700			Nova Scotia	403,700			2,422 20		2,500			108,500			514,700		
583,175			3,818,400				4,401,575			Manitoba	3,406,925			20,441 55					994,650			4,401,575		
281,450			529,775			217,500	1,028,725			British Columbia	736,775			4,420 65		17,300			274,650			1,028,725		
15,447,535	188,700	140,000	*1,200 62,921,535	304,450	1,686,250	616,910	78,987,180	493,150	1,826,250	Totals	1,200 61,797,985	429,550	1,328,500	376,070 46	616,910	167,275	22,700	17,300	16,386,510	63,600	475,050	78,987,180	493,150	1,826,250

* 1,200 cigars at $7 per M.

	1899.	1900.
Total duty collected ex-manufactory and ex-warehouse	$768,496 74	$811,612 89
" on licenses	12,822 50	14,030 00
Totals	$781,319 24	$825,642 89

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—INSPECTION OF PETROLEUM.

No. 24.—Return of Fees from July 1 to August 31, 1899.

Revenue Divisions.	Packages. At 25 cts. Canadian.	At 25 cts. Imported.	At 10 cts. Canadian.	At 10 cts. Imported.	At 5 cts. Canadian.	At 5 cts. Imported.	At 2½ cts. Canadian.	At 2½ cts. Imported.	Fees Collected.
	No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
Belleville, Ont.			171	123					29 40
Brantford "			402						40 20
Cornwall "				99					9 90
Guelph "			175	110					28 50
Hamilton "			968	718					168 60
Kingston "			471	323					79 40
London "			8,456	556	4		12,868		1,223 10
Ottawa "			1,748	530					227 80
Owen Sound "			356	71					42 70
Perth "			162						16 20
Port Arthur "				180					18 00
Prescott "			345	140					48 50
St. Catharines "				93					9 30
Stratford "			665	37					70 20
Toronto "			5,119	2,053		2			717 30
Windsor "		1		197		9		24	21 07
Totals		1	19,038	5,230	4	11	12,868	24	2,750 17
Montreal, Que			10,387	2,619					1,300 60
Quebec "				14					1 40
Sherbrooke "				215					21 50
Three Rivers "			400						40 00
Victoriaville "			70						7 00
Totals			10,857	2,848					1,370 50
St. John, N. B.			1,423	3,295	20	1	10	3	473 19
Halifax, N.S.			414	2,377				1,654	320 45
Pictou "				49					4 90
Totals			414	2,426				1,654	325 35
Charlottetown, P.E.I.				150					15 00
Winnipeg, Man.	3		494	1,499				1,200	230 05
Calgary, N.W.T				1				50	1 35
Vancouver, B.C				271		300		10,930	315 35
Victoria "								870	21 75
Totals				271		300		11,800	337 10
Grand totals	3	1	32,226	15,720	24	312	12,878	14,731	5,502 71

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX A—*Continued*—INSPECTION OF PETROLEUM.

No. 24 (A.)—Return of Canadian Petroleum and Naphtha inspected, from September 1, 1899, to June 30, 1900.

Division.	Licenses. No.	Licenses. Fees.	Petroleum.	Naphtha.	Total.
		$	Galls.	Galls.	Galls.
London	2	2	10,323,076 08	1,273,359 21	11,596,435 29

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

No. 25.—Statement for the Year ended June 30, 1899, and period July 1 to August 31, 1899.

Years.	Provinces.	Packages. At 25 cts.	Packages. At 10 cts.	Packages. At 5 cts.	Packages. At 2½ cts.	Fees Collected.
		No.	No.	No.	No.	$ cts.
1899	Ontario	2	234,613	71	63,177	25,045 31
	Quebec		85,707	1	450	8,582 00
	New Brunswick		43,606	46	509	4,375 88
	Nova Scotia	5	18,957	1	7,466	2,083 66
	Prince Edward Island		2,513			251 30
	Manitoba	34	22,360		7,445	2,430 63
	N. W. Territories		95		3,357	93 43
	British Columbia		2,434	4,571	109,026	3,197 60
	Totals	41	410,285	4,690	191,430	46,059 81
July 1 to Aug., 1899	Ontario	1	24,268	15	12,892	2,750 17
	Quebec		13,705			1,370 50
	New Brunswick		4,718	21	13	473 19
	Nova Scotia		2,840		1,654	325 35
	Prince Edward Island		150			15 00
	Manitoba	3	1,993		1,200	230 05
	N. W. Territories		1		50	1 35
	British Columbia		271	300	11,800	337 10
	Totals	4	47,946	336	27,609	5,502 71

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 26.—Return of Manufactures

Divisions.	Licenses.		Materials used.				Manu
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.	Vinegar.
		$ cts.	Galls.	Galls.	Lbs.	Lbs.	Galls.
Brantford, Ont......	2	100 00	14,198·67	681·00	....	....	81,483·32
Hamilton "	3	125 00	15,245·37	201·50	....	....	80,689·14
Kingston "	1	50 00	6,871·76	237·64	....	....	48,936·14
Prescott "	1	300 00	116,244·29	....	565,554	61,755	....
Toronto " ...	6	300 00	58,855·19	1,002·70	....	....	318,424·64
Windsor "	3	400 00	2,238·91	....	9,715	1,247½	....
Totals..........	16	1,275 00	213,654 19	2,122·84	575,269	63,002½	529,533·24
Montreal, Que.......	7	300 00	14,742·52	181·80	....	....	63,953·37
Quebec "	1	50 00	16,980·58	870·00	....	....	90,550·29
St. Hyacinthe, Que..	1	50 00	1,506·30	1·90	....	....	4,587·00
Sherbrooke, Que.....	3	375 00	35,988·87	618·10	74,635	9,163	123,253·80
Totals..........	12	775 00	69,218·27	1,671·80	74,635	9,163	282,344·46
St. John, N.B. ...	1	50 00	3,892 50	174·40	....	....	25,167·30
Grand totals.....	29	2,100 00	286,764·96	3,969·04	649,904	72,165½	837,045·00

Inland Revenue Department,
Ottawa, September 22, 1900.

for the year ended June 30, 1900.

...factured.		Paid duty Ex-Manufactory.			Warehoused.			Total Duty collected Ex-Manufactory, including License Fees.
Acetic Acid.	Crude Fulminate	Vinegar.	Acetic Acid.	Duty.	Vinegar.	Acetic Acid.	Crude Fulminate	
Galls.	Lbs.	Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.	$ cts.
....	......	79,815·62	....	3,192 62	1,667 70	....	....	3,292 62
....	....	40,021·78	....	1,600 81	40,667·36	....	....	1,725 81
....	....	26,180·39	....	1,047 22	22,755·75	....	....	1,097 22
....	76,628	....	....	....	....	....	76,628	300 00
189,511·36	....	184,120·90	163,166·28	13,891 51	134,303·74	26,345·08	....	14,191 51
....	1,492¾	....	....	....	....	....	1,492¾	400 00
189,511·36	78,120¾	330,138·69	163,166·28	19,732 16	199,394·55	26,345·08	78,120¾	21,007 16
45,316·14	....	63,953·37	44,772·14	4,572 79	....	544·00	....	4,872 79
....	....	67,211·64	....	2,688 45	23,338·65	....	....	2,738 45
....	......	4,587·00	....	183 48	....	....	....	233 48
....	10,782	102,993·99	....	4,119 77	20,259 81	....	10,782	4,494 77
45,316·14	10,782	238,746·00	44,772·14	11,564 49	43,598·46	544·00	10,782	12,339 49
....	....	18,977·76	.....	759 13	6,189·54	....	....	809 13
234,827·50	88,902¾	587,862·45	207,938·42	32,055 78	249,182·55	26,889·08	88,902¾	34,155 78

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 27.—Comparative Statement of Manufactures

Provinces.	Licenses.		Materials Used.				Manufac	
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.	Vinegar.	Acetic Acid.
1899.		$ cts.	Galls.	Galls.	Lbs.	Lbs.	Galls.	Galls.
Ontario...... ..	15	1,225 00	187,517·33	2,401·14	504,682	54,435	503.288·04	315,812·83
Quebec....	10	725 00	104,631·07	1,095·88	284,310	34,826	244,187·06	112,712 72
New Brunswick...	1	50 00	1,616·93	28·00	....	......	8,459·12	......
Totals.. ...	26	2,000 00	293,765·33	3,525 02	788,992	89,261	755,934·22	428,525·55
1900.								
Ontario.....	16	1,275 00	213,654 19	2,122 84	575,269	63,002½	529,533·24	189,511·36
Quebec...........	12	775 00	69,218 27	1,671 80	74,635	9,163	282,344·46	45,316·14
New Brunswick...	1	50 00	3,892 50	174 40	....	....	25,167·30	....
Totals... ...	29	2,100 00	286,764 96	3,969 04	649,904	72,165½	837,045·00	234,827·50

Inland Revenue Department,
Ottawa, September 22, 1900.

for the years ended June 30, 1899 and 1900.

TURED.	PAID DUTY EX-MANUFACTORY.			WAREHOUSED.			Total Duty Collected Ex-Manufactory, including License Fees.
Crude Fulminate.	Vinegar.	Acetic Acid.	Duty.	Vinegar.	Acetic Acid.	Crude Fulminate.	
Lbs.	Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.	$ cts.
67,720	442,084·76	247,214·79	29,086 26	61,203·28	68,598·04	67,720	30,311 26
39,799	218,792·14	51,605·63	10,884 26	25,394·92	61,107·09	39,799	11,609 26
....	8,459·12	....	338 37	....	....	....	388 37
107,519	669,336·02	298,820·42	40,308 89	86,598·20	129,705·13	107,519	42,308 89
78,120¾	330,138·69	163,166·28	19,732 16	199,394·55	26,345·08	78,120¾	21,007 16
10,782	238,746·00	44,772·14	11,564 49	43,598·46	544·00	10,782	12,339 49
....	18,977·76	....	759 13	6,189·54	....	....	809 13
88,902¾	587,862·45	207,938·42	32,055 78	249,182·55	26,889·08	88,902¾	34,155 78

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

DR. No. 28.—WAREHOUSE RETURN for the Year ended June 30, 1900. CR.

Remaining in Warehouse from Last Year.		Placed in Warehouse.			Received from other Divisions.	Totals.			Divisions.	Entered for Consumption.			Removed to other Divisions.	Free.	Exported.	Remaining in Warehouse.		Totals.		
Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.	Vinegar.	Vinegar.	Acetic Acid.	Crude Fulminate.		Vinegar.	Acetic Acid.	Duty.	Vinegar.	Vinegar.	Crude Fulminate.	Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.
Galls.	Galls.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Lbs.		Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Galls.	Lbs.
1,571 97		1,667·70				3,239 67			Brantford, Ont	2,132 97		85 32				1,106·70		3,239 67		
		40,667 36				40,667 36			Hamilton, "	25,692 15		1,027 68				14,975·21		40,667·36		
3,299 75		22,755·75				26,055 50			Kingston, "	8,345·50		333 82	17,710·00					26,055 50		
				76,628				76,628	Prescott, "						76,628					76,628
	26,800·33	134,303 74	26,345·08		9,646 71	143,950 45	53,145 41		Toronto, "	33,814 26	26,800·33	2,424 60	6,685 50	4,451 19		98,999 50	26,345 08	143,950 45	53,145 41	
				1,492¾				1,492¾	Windsor, "						1,492¾					1,492¾
4,871 72	26,800 33	199,394 55	26,345·08	78,120¾	9,646·71	213,912 98	53,145 41	78,120¾	Totals	69,984 88	26,800·33	3,871 42	24,395 50	4,451·19	78,120¾	115,081 41	26,345 08	213,912 98	53,145 41	78,120¾
	3,390 65		544 00		16,194 18	16,194 18	3,934·65		Montreal, Que	16,194·18	3,934 65	805 15						16,194 18	3,934 65	
15,628 50		23,338 65				38,967 15			Quebec, "	17,654·56		706 18	1,445·39			19,867 20		38,967 15		
		20,259·81		10,782		20,259 81		10,782	Sherbrooke, "	7,516·99		300 68			10,782	12,742·82		20,259 81		10,782
15,628 50	3,390·65	43,598 46	541 00	10,782	16,194 18	75,421 14	3,934 65	10,782	Totals	41,365·73	3,934·65	1,812 01	1,445·39		10,782	32,610·02		75,421·14	3,934 65	10,782
		6,189 54				6,189·54			St. John, N.B							6,189 54		6,189 54		
20,500 22	30,150 98	249,182·55	26,889 08	88,902¾	25,840·89	295,523 66	57,080 06	88,902¾	Grand totals	111,350·61	30,734 98	5,683 43	25,840·89	4,451·19	88,902¾	153,880·97	26,345 08	295,523·66	57,080 06	88,902¾

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 29.—Comparative Statement of Warehouse Returns for the Years ended June 30, 1899 and 1900.

Dr.

Provinces.	Remaining in Warehouse from Last Year.		Placed in Warehouse.			Received from other Divisions.	Totals.		
	Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.	Vinegar.	Vinegar.	Acetic Acid.	Crude Fulminate.
	Galls.	Galls.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Lbs.
1899.									
Ontario	11,310 07		61,203 28	68,598 04	67,720	11,114 49	86,657 84	68,598 04	67,720
Quebec	4,486 99	1,113 84	25,394 92	61,107 09	39,799	7,495 13	34,347 04	62,220 93	39,799
Totals	15,797 06	1,113 84	86,598 20	129,705 13	107,519	18,609 62	121,004 88	130 818 97	107,519
1900.									
Ontario	1,871 72	26,800 33	199,394 55	26,315 08	78,120⅘	9,616 71	213,912 98	53,145 41	78,120⅘
Quebec	15,628 50	3,390 65	43,598 16	544 00	10,782	16,194 18	75,421 14	3,934 65	10,782
New Brunswick			6,189 54	....		....	6,189 54	....	....
Totals	20,500 22	30,190 98	249,182 55	26,889 08	88,902⅘	25,840 89	295,523 66	57,080 06	88,902⅘

Cr.

Provinces.	Entered for Consumption.			Removed to other Divisions.	Exported.		Remaining in Warehouse.		Totals.		
	Vinegar.	Acetic Acid.	Duty.	Vinegar.	Vinegar.	Crude Fulminate.	Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.
	Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Galls.	Lbs.
1899.											
Ontario	64,186·67	41,797 71	4,239 40	16,662 15	937 30	67,720	4,871 72	26'800 33	86,657·84	68,598 04	67,720
Quebec	16,771 07	58,830 28	3,024 03	1,947 47	....	39,799	15,628 50	3,390 65	34,347 04	62,220·93	39,799
Totals	80,957 74	100,627 99	7,263 43	18,609·62	937 30	107,519	20,500·22	30,190 98	121,004 88	130,818 97	107,519
1900.					Free.						
Ontario	69,984 88	26,800 33	3,871 42	24,395 50	4,451 19	78,120⅘	115,081 41	26,345 08	213,912 98	53,145 41	78,120⅘
Quebec	41,365·73	3,934 65	1,812 01	1,445 39	....	10,782	32,610 02	....	75,421 14	3,934 65	10,782
New Brunswick	....	....	....	....	....	....	6,189 54	....	6,189·54	....	....
Totals	111,350 61	30,734·98	5,683 43	25,840 89	4,451 19	88,902⅘	153,880 97	26,345·08	295,523·66	57,080·06	88,902⅘

	1899.	1900.
Total duty collected, ex-manufactory and ex-warehouse	$ 47,572 32	$ 37,739 21
" on licenses	2,000 00	2,100 00
Totals	$ 49,572 32	$ 39,839 21

Inland Revenue Department,
Ottawa, September 22, 1900.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 30.—STATEMENT showing the transactions in Vinegar in the Bonded Manufactories in the Dominion of Canada, during the Year ended June 30, 1900.

On hand July 1, 1899.	Manufactured during the Year.	Brought in.	Totals.	Divisions.	Removed.	On hand June 30, 1900.	Totals.
Galls.	Galls.	Galls.	Galls.		Galls.	Galls.	Galls.
1,571 97	81,483 32	....	83,055 29	Brantford, Ont	81,948 59	1,106 70	83,055 29
....	80,689 14	5,753 92	86,443 06	Hamilton "	64,519 28	21,923 78	86,443 06
3,299 75	48,936 14	....	52,235 89	Kingston "	52,235 89	....	52,235 89
....	318,424 64	....	318,424 64	Toronto "	219,425 14	98,999 50	318,424 64
4,871 72	529,533 24	5,753 92	540,158 88	Totals	418,128 90	122,029 98	540,158 88
3,930 62	63,953 37	29,059 37	96,943 36	Montreal, Que	90,155 04	6,788 32	96,943 36
15,628 50	90,550 29	....	106,178 79	Quebec "	86,311 59	19,867 20	106,178 79
753 42	4,587 00	830 75	6,171 17	St. Hyacinthe, Que	5,805 88	365 29	6,171 17
2,234 58	123,253 80	....	125,488 38	Sherbrooke "	109,808 16	15,680 22	125,488 38
22,547 12	282,344 46	29,890 12	334,781 70	Totals	292,080 67	42,701 03	334,781 70
....	25,167 30	....	25,167 30	St. John, N.B.	18,977 76	6,189 54	25,167 30
27,418 84	837,045 00	35,644 04	900,107 88	Grand Totals	729,187 33	170,920 55	900,107 88

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX A—*Continued*—METHYLATED SPIRITS.

No. 31.—Statement showing quantity of Raw Materials on hand at beginning and end of year and brought in and used during the Year 1899–1900.

Dr. Cr.

(A)

Names of Articles.	Stock on hand July 1, 1899.	Brought in during the year.	Total to be accounted for.	Used in manufacture of Methylated Spirits.	Sold* or lost by Leakage.	Stock on hand June 30, 1900.	Total accounted for.
	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.
Alcohol	3,061·32	62,364·28	65,425·60	58,547·04	69·33* 2,421·71†	4,387·52	65,425·60
Wood naphtha	1,383·42	31,974·50	33,357·92	23,682·59	168·00* 4,389·51†	5,117·82	33,357·92

(B)

Statement showing quantity of Raw Materials used and Methylated Spirits produced therefrom.

Alcohol used. Statement (A) above.	Wood Naphtha used. Statement (A) above.	Methylated Spirits used. Statement (C) below.	Total to be accounted for.	Methylated Spirits produced.	Loss in Manufacture.		Total accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	p. c.	Pr'f galls.
58,547·04	23,682·59	....	82,229·63	81,319·86	909·77	0·89	82,229·63

(C)

Statement showing quantity of Methylated Spirits on hand at beginning and end of year, and brought in, sold and otherwise accounted for during the year.

Stock on hand July 1, 1899.	Manufactured as above. Statement (B).	Brought in during the year.	Total to be accounted for.	Sold.	Used in Methylated Spirits Warehouse.	Re-used in manufacture of Methylated Spirits.	Stock on hand June 30, 1900.	Total accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.
4,442·68	81,319·86	....	85,762·54	81,095·28	1,755·58	....	2,911·68	85,762·54

† Lost in great conflagration (Hull and Ottawa fire, April 26, 1900).

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX A—*Continued.*

No. 32.—Statement of Lumber measured, culled and counted, through the Office of the Supervisor of Cullers, at the Port of Quebec, during the Fiscal Year ended June 30, 1900.

Pieces.	Description.	Measured, culled and counted.	Tons standard.	Rate.	Cullers' fees.	Total accrued
				cts.	$ cts.	$ cts.
24,543	Waney White Pine	Stringed	35,838 38			
2	" Red Pine	"	1 32			
6	" Oak	"	1 35			
36	" Elm	"	32 10			
3,167	" Ash	"	2,112 18			
16,371	" Birch	"	8,242 09			
169	" Maple	"	221 23			
5	" Walnut	"	4 20			
148	" Cherry	"	54 14			
175	" Hickory	"	75 31			
4	" Butternut	"	2 12			
			46,588 02	9⅜	4,367 63	
12,530	Square White Pine	Measured	12,830 18			
631	" Spruce	"	471 32			
			13,302 10	6¼	831 69	
2,134	Square Red Pine	"	1,988 02			
9,459	" Oak	"	15,777 27			
12,779	" Elm	"	14,922 11			
6,626	" Birch	"	3,091 13			
44	" Hickory	"	43 35			
2	" Tamarac	"	1 31			
			35,824 39	8¼	2,955 56	
						8,154 58
				Add for	fractions	0 16
						8,154 74

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

HYDRAULIC AND OTHER RENTS, &C.

LESSEES' ACCOUNTS, 1899-1900

DR. No. 33.—HYDRAULIC and other Rents, &c.,

Balances due on July 1, 1899.	Rents and Interest accrued up to the June 30, 1900.	Totals.	Numbers.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
100 00	200 00	300 00	1	Ottawa River...	Perley & Pattee........	J. R. Booth.......
50 00	100 00	150 00	2	"	Thompson & Perkins....	" ....
150 00	300 00	450 00	3	"	Lyman Perkins........	" ....
....	300 00	300 00	4	"	R. Blackburn, *et al.*.....	McKay Milling Co., Ltd
....	100 00	100 00	5	"	J. & J. Petrie.	Ottawa Electric Co....
....	100 00	100 00	6	"	A. H. Baldwin.....	" ....
....	300 00	300 00	7	"	....	Ottawa Electric Ry Co.
....	400 00	400 00	8	"	Perley & Pattee.........	Ottawa Electric Co....
50 00	100 00	150 00	9	"	J. M. Currier...	N. S. Blaisdell ....
....	600 00	600 00	10	"	Harris, Bronson & Co...	The Bronson & Weston Lumber Co. ....
....	200 00	200 00	11	"	Levi Young	Ottawa Electric Ry Co.
....	104 00	104 00	12	"	....	J. R. Booth...........
....	10 00	10 00	13	"	....	Bronson & Weston ....
....	100 00	100 00	14	"	....	" ..
....	96 00	96 00	15	"	Perley & Pattee.........	J. R. Booth...........
32 00	8 00	40 00	16	"	L. M. Coutlee	Mary Conroy ... .
570 84	....	570 84	17	"	....	John Rochester........
....	25 00	25 00	18	"	Nérée Têtreau..........	Thomas Ahearn.......
200 00	....	200 00	19	"	Hon. J. Skead....	....
96 00	....	96 00	20	"	"	....
....	1 00	1 00	21	"	G. A. Grier & Co........	Ottawa Investment Co.
980 00	....	980 00	22	"	....	D. Carmichael ....
380 00	....	380 00	23	"	....	John Rankin...... ...
75 00	150 00	225 00	24	"	J. R. Booth	....
40 00	5 00	45 00	25	"	Colin Dewar............	....
....	50 00	50 00	26	"	Bronson & Weston......	....
1 00	1 00	2 00	27	"	....	Alfred Desjardins.....
....	10 00	10 00	28	"	....	Ottawa Elctric Co.....
....	1 00	1 00	1	St. Lawrence R.	Que. Har. Commissioners	....
25 00	25 00	50 00	2	....	Rich. and Ont. Nav. Co.	....
....	1 00	1 00	3	....	....	Narcisse Blais.........
1 00	1 00	2 00	4	Quebec.........	Corporation of Quebec...	....
....	5 00	5 00	5	Richibucto Har.	Wm. Hudson......	....
....	1 00	1 00	6	Rondeau Har...	School Trustees	....
....	1 00	1 00	7	Collingwood Har	Great North'n Transit Co	....
....	1 00	1 00	8	Ottawa...	E. G. Laverdure........	....
....	1 00	1 00	9	Walkerton, Ont.	D. Robertson & J. Rowland..	....
....	1 00	1 00	10	Three Rivers....	Corporation of Three Riv.	....
165 00	....	165 00	11	British Columbia	A. Peel..........	....
90 00	....	90 00	12	"	Jonathan Maury.. ..	....
25 00	25 00	50 00	13	"	Roderick Finlayson.....	....
25 00	25 00	50 00	14	"	Joseph Spratt..........	....
....	1 00	1 00	15	"	Bank of British Columbia	....
....	1 00	1 00	16	"	W. Dodd..........	....
....	12 00	12 00	17	"	D. W. Gordon..........	....

SESSIONAL PAPER No. 12

Lessees' Accounts, 1899–1900. Cr.

Description of Property.	Numbers.	Date to which Account is made up.	Abatements.	Paid during Fiscal Year.	Balances due on June 30, 1900.	Totals.
			$ cts.	$ cts	$ cts.	$ cts.
Lots B and C, Chaudière St., service ground	1	June 30, 1900	....	200 00	100 00	300 00
Lot D	2	" 30, 1900	....	100 00	50 00	150 00
Lots A, F and G, South Head St.	3	" 30, 1900	....	300 00	150 00	450 00
Lots H, I and J, grist mill, South Head St.	4	" 30, 1900	....	300 00	....	300 00
Lot K, fanning mill, South Head St.	5	Dec. 31, 1899	....	100 00	....	100 00
Lot L, service ground	6	" 31, 1899	....	50 00	50 00	100 00
Lots Q, R and T, service ground, North Middle St	7	" 31, 1899	....	300 00	....	300 00
Lots M, N, O and P, service ground (no water used)	8	" 31, 1899	....	200 00	200 00	400 00
Lot S, service ground	9	June 30, 1900	....	150 00	....	150 00
Lots U, V, W, X, Y and Z, service ground	10	" 30, 1900	....	600 00	....	600 00
Two strips of land	11	Jan. 1, 1901	....	200 00	....	200 00
Lumber yard at head of Slides	12	Sept. 20, 1900	....	104 00	....	104 00
Bridge over Slides	13	June 30, 1901	....	10 00	....	10 00
Strip of land, Amelia Island	14	Jan. 1, 1901	....	100 00	....	100 00
Reserve, head of Chaudière Island	15	" 1, 1901	....	96 00	....	96 00
Small island, Deschênes Rapids	16	" 1, 1900	....	....	40 00	40 00
Portion of lot 39, Concession 'A', Nepean	17	Feb. 1, 1885	....	....	570 84	570 84
Excavated channel slide and two dams, Little Chaudière	18	Mar. 1, 1901	....	25 00	....	25 00
Water lots opposite lot 30, Con. 'A', Nepean	19	Dec. 1, 1891	....	....	200 00	200 00
Three small islands, Ottawa River	20	May 1, 1882	....	....	96 00	96 00
Covering over portion of Ottawa Slides	21	Nov. 10, 1900	....	1 00	....	1 00
Water lot, Calumet	22	June 30, 1899	980 00	....	....	980 00
East portion of Hawley's Island	23	June 30, 1881	....	....	380 00	380 00
Piece of land, south-west end of Union Bridge	24	Nov. 12, 1900	....	150 00	75 00	225 00
Piece of land on Victoria Island	25	June 15, 1901	....	....	45 00	45 00
Piece of land, south side of Middle St., Victoria Island	26	Aug. 31, 1900	....	50 00	....	50 00
Piece of land, Longue Pointe Rouge, Templeton, Ottawa County	27	Oct. 24, 1900	....	....	2 00	2 00
Lot Pa, South Head St.	28	Jan. 10, 1901	....	....	10 00	10 00
Small lot near Custom House, Quebec	1	Sept. 1, 1900	....	1 00	....	1 00
Roadway from pier at Côteau Landing	2	July 1, 1900	....	....	50 00	50 00
Privilege to erect bridge on St. Charles River	3	Feb. 6, 1901	....	1 00	....	1 00
Old Provincial Government Building grounds on Mountain Hill	4	June 25, 1901	....	2 00	....	2 00
Piece of land at North Beach	5	" 30, 1900	....	5 00	....	5 00
Use of old log house formerly used as Custom House, Shrewsbury, Ont.	6	Sept. 11, 1899	....	1 00	....	1 00
Use of old breakwater for storing coal	7	Feb. 5, 1901	....	1 00	....	1 00
South-east half of lot 8, Ottawa	8	Dec. 18, 1900	....	....	1 00	1 00
Right of way over strip of land	9	Apr. 27, 1901	....	1 00	....	1 00
Lot of land on St. Christopher Island, St. Maurice River	10	Dec. 11, 1900	....	....	1 00	1 00
Portion of Assay Office, New Westminster	11	June 11, 1881	....	....	165 00	165 00
" " "	12	" 11, 1881	....	....	90 00	90 00
Privilege to erect two bulk heads, Rock Bay, Victoria Harbour	13	" 1, 1901	....	25 00	25 00	50 00
Privilege to build a wharf opposite his own property, Victoria Harbour	14	" 1, 1901	....	25 00	25 00	50 00
Right of drainage through Government property, Nanaimo	15	Dec. 1, 1900	....	1 00	....	1 00
Old Government House, Yale	16	July 24, 1899	....	1 00	....	1 00
Beach lots A, C, E and F, front of 7, 8 and 9, Nanaimo Harbour	17	Aug. 27, 1900	....	12 00	....	12 00

DR. No. 33.—HYDRAULIC and other Rents, &c.,

Balances due on July 1, 1899.	Rents and Interest accrued up to the June 30, 1900.	Totals.	Numbers.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
....	5 00	5 00	18	British Columbia	S. Williams............	... .
....	5 00	5 00	19	"	Geo. A. Huff	.. ..
....	1 00	1 00	20	"	Can. Pac. Railway Co..	....
....	50 00	50 00	21	"	John Reid	....
70 00	....	70 00	22	Rivière du Lièvre	Dominion Phosphate Co., Ltd., London, Eng....	....
... .	1 00	1 00	23	Charlottetown ..	Rt. Rev. Bishop McIntyre	Rt. Rev. Bishop McDonald... .. ..
20 00	20 00	40 00	24	Rivière St. Maurice	Laurentides Pulp Co., Ltd	....
100 00	....	100 00	25	"	Jos. Ant. Gagnon. .. .	....
....	16 00	16 00	26	Antigonish, N.S	....	L. C. Archibald.......
....	1 00	1 00	27	Owen Sound ...	Grand Trunk Railway...	....
180 00	60 00	240 00	28	Windsor..... ..	Archie McNee.........	....
....	1 00	1 00	29	Lévis, Quebec...	....	Cyrille Robitaille......
....	1 00	1 00	30	Port Morien, N.S	The Gourie & Blackhouse Collieries, Ltd.... ...	....
....	5 00	5 00	31	Bayfield, N.S...	Charles S. Gass........	....
3,425 84	3,528 00	6,953 84				

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

Lessees' Accounts, 1899–1900—*Continued.*

Description of Property.	Numbers.	Date to which Account is made up.	Abatements.	Paid during Fiscal Year.	Balances due on June 30, 1900.	Totals.
			$ cts.	$ cts.	$ cts.	$ cts.
Frontage on lot 7, block M, Victoria	18	July 16, 1900	....	5 00	....	5 00
Permission to build a wharf on lot A, block 2, Somas River, Alberni, B.C	19	Aug. 12, 1900	... .	5 00	....	5 00
Portion of Custom House lot, New Westminster	20	Apr. 14, 1901	....	1 00	....	1 00
Lot 1, block 13, cor. Begbie and Columbia Sts., New Westminster	21	May 12, 1901	....	50 00	... .	50 00
Permission to erect a landing at Little Rapids, Rivière du Lièvre	22	Apr. 30, 1898	....	....	70 00	70 00
Leave to connect drain to main service of public building	23	May 6, 1901	... .	1 00	... .	1 00
Tract of land, Chûte de la Grand-Mère, St. Maurice River	24	June 17, 1901	.... .	20 00	20 00	40 00
Water lot on St. Maurice River	25	Mar. 8, 1900	100 00	....	... .	100 00
Tract of land and water lot, McNair's Cove	26	Dec. 30, 1900	....	16 00	....	16 00
Lot of land west of Sydenham River	27	" 31, 1900	....	1 00	....	1 00
Lot on Ouellette St., Windsor, Ont	28	Apr. 30, 1900	....	....	240 00	240 00
Ground rent	29	" 4, 1901	....	1 00	....	1 00
Water lot for the purpose of constructing a pier	30	Dec. 20, 1900	....	1 00	....	1 00
Water lot	31	" 7, 1900	....	....	5 00	5 00
Totals	....	....	1,080 00	3,213 00	2,660 84	6,953 84

E. MIALL,
Commissioner.

APPENDIX

No. 33 (A).—Hydraulic and other Rents, &c.—

Balances due on July 1, 1899.	Totals.	Numbers.	Location.	Name of Proprietors.
$ cts.	$ cts.			Land Sales—Principal Account.
12,092 83	12,092 83	1	Hamilton and Port Dover Road..	Choat & Kern
433 34	433 34	2	Bonner's property, Quebec.	Timothy Sullivan, now M. Murphy..
333 34	333 34	3		John Bailey, now Alex. Powell
300 00	300 00	4		Abraham Thompson
147 80	147 80	5		John Boomer
248 40	248 40	6		John Garbatz, now J. C. Nolan
154 80	154 80	7		N. H. Bowen
600 00	600 00	8		Estate Robert Reid
333 33	333 33	9		John Chevalier
533 33	533 33	10		Daniel Holden
333 33	333 33	11		George Creeley
63 00	63 00	12		Thomas McAdam
15,573 50	15,573 50			
				Land Sales—Interest Account.
6,298 25	6,298 25	1	Hamilton and Port Dover Road..	Choat & Kern (matured)
558 00	558 00	2	Bonner's property, Quebec.	Timothy Sullivan, now M. Murphy.
120 00	120 00	3		John Bailey, now Alex. Powell
306 00	306 00	4		Abraham Thompson
155 22	155 22	5		John Boomer
275 82	275 82	6		John Garbatz, now J. C. Nolan
208 95	208 95	7		N. H. Bowen
828 00	828 00	8		Estate Robert Reid
190 00	190 00	9		John Chevalier
298 68	298 68	10		Daniel Holden
35 91	35 91	11		George Creeley
100 00	100 00	12		Thomas McAdam
100 00	100 00	13		Joseph Brook, tenant
9,474 83	9,474 83			

Inland Revenue Department,
Ottawa, September 22, 1900.

SESSIONAL PAPER No. 12

A—*Concluded.*

Lessees' Accounts, 1899–1900—*Concluded.*

Description of Property.	Numbers.	Date to which the account is made up.	Balances due on June 30, 1900.	Totals.
			$ cts.	$ cts.
Hamilton and Port Dover Road & Caledonia Bridge	1		12,092 83	12,092 83
Lot No. 1, Wolfe Street	2		433 34	433 34
" 9 "	3		333 34	333 34
" 49 "	4		300 00	300 00
" 73 and 74, Tower Street	5		147 80	147 80
" 64, Wolfe Street and 211 and 252 Ware Street	6		248 40	248 40
" 67 and 68, Monument Street	7		154 80	154 80
" 22 and 23, Wolfe Street	8		600 00	600 00
" 32, Wolfe Street	9		333 33	333 33
" 65 and 66, Wolfe Street	10		533 33	533 33
" 31, Wolfe Street	11		333 33	333 33
" 135, Church Street	12		63 00	63 00
			15,573 50	15,573 50
	1	June 30, 1874	6,298 25	6,298 25
Lot No. 1, Wolfe Street	2	May 1, 1889	558 00	558 00
" 9 "	3	"	120 00	120 00
" 49 "	4	"	306 00	306 00
" 73 and 74, Tower Street	5	"	155 22	155 22
" 64, Wolfe Street, and 211 and 252 Ware Street	6	"	275 82	275 82
" 67 and 68, Monument Street	7	"	208 95	208 95
" 22 and 23, Wolfe Street	8	"	828 00	828 00
" 32, Wolfe Street	9	Nov. 1, 1863	190 00	190 00
" 65 and 66, Wolfe Street	10	"	298 68	298 68
" 31, Wolfe Street	11	"	35 91	35 91
" 135, Church Street	12	"	100 00	100 00
Monument Hotel	13	"	100 00	100 00
			9,474 83	9,474 83

E. MIALL,
Commissioner.

APPENDIX B.

No. 1.—Details of Excise Expenditures for the Year ended June 30, 1900.

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
McAllister, A.	Salary as Collector for year	....	33 60	7 20	1,639 20	
Standish, J. G.	" Special Class Exciseman for year	...	28 04	1 80	1,370 16	
Pole C. W.	" Deputy Collector for year	......	25 20	3 60	1,231 20	
McCoy, W.	" 1st Class Exciseman "	...	19 96	2 88	977 16	
McCuaig, A. F.	" Deputy Collector "	......	16 04	2 88	781 08	
McFee, A. C.	" 3rd Class Exciseman "	......	23 52	2 88	648 60	
	Salaries	....	146 36	21 24	6,647 40	
	Contingencies	.....	....	......	438 50	
						7,085 90
	Brantford.					
Spence, John.	Salary as Collector for year	......	31 96	7 20	1,560 84	
Sinon, E. H.	" Deputy Collector for year	.....	24 00	3 60	1,172 40	
Weyms, C.	" 1st Class Exciseman "	...	19 96	2 88	977 16	
Bell, J. E.	" " "	.....	19 96	2 88	977 16	
Boyle, P.	" " from July 1 to March 31	Insurance. 53 82	22 41	2 16	671 57	
Hart P. D.	" 2nd Class Exciseman for year	. .	16 96	2 88	830 16	
Orr, H. N.	" " from July 1 to Dec. 31, and 1st Class Exciseman from Jan. 1 to June 30	......	27 92	2 88	769 20	
Berry, H. L.	" 3rd Class Exciseman from April 1 to June 30	7 50	....	0 72	141 78	
Walsh, D. J.	" Special Class Exciseman from June 1 to June 30	.....	2 00	0 36	97 64	
	Insurance	53 82				
	Salaries	7 50	165 17	25 56	7,197 91	
	Contingencies	....	....	......	1,032 35	
						8,230 26
	Cornwall.					
Mulhern, M. M.	Salary as Collector for year	......	20 00	3 60	976 40	
	Contingencies	......	....	....	92 00	
						1,068 40
	Guelph.					
Powell, J. B.	Salary as Collector for year	..	36 00	7 20	1,756 80	
Till, T. M.	" Deputy Collector for year	.....	25 96	3 60	1,270 44	
Dawson, W.	" Special Class Exciseman for year	...	28 04	4 32	1,367 64	
Woodward, G. W.	" " "	......	24 00	4 32	1,171 68	
Lynes, K.	" Special Class Exciseman from July 1 to August 31	...	4 00	0 72	195 28	
Broadfoot, S.	" Accountant for year	.....	19 96	4 32	975 72	
Bish, P.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Spence, F. H.	" " "	.....	19 96	1 44	978 60	
Bowman, A.	" " "	......	19 96	2 88	977 16	
O'Donohue, M. J.	" " "	....	19 17	2 88	934 20	
Kilroy, E. T.	" " "	.....	19 17	2 88	934 20	
O'Brien, E. C.	" 2nd " "	......	16 96	2 88	830 16	
Howie, A.	" 3rd " "	......	15 00	2 88	732 12	
Brain, A. F.	" 1st " "	...	29 68	2 88	817 44	
Alteman, P. J.	" 3rd " "	....	22 55	2 88	619 57	
	Salaries	.....	320 37	48 96	14,538 17	
	Contingencies	......	....	....	1,245 77	
						15,783 94

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APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899–1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Hamilton.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Miller, W. F.	Salary as Collector for year	......	43 96	14 40	2,141 64	
Ross, S. F.	" Deputy Collector for year	....	30 00	7 20	1,462 80	
Cameron, D. M.	" Special Class Exciseman "	.....	30 00	4 32	1,465 68	
Donaghy, W.	" " "	..	28 04	4 32	1,367 64	
Baby, W. A. D.	" " "	.....	28 04	4 32	1,367 64	
Crawford, W. P.	" Accountant "	......	22 45	4 32	1,098 23	
O'Brien, J. F.	" 1st Class Exciseman "	.....	19 96	2 88	977 16	
Irwin, R.	" " "	......	19 96	2 88	977 16	
Dumbrille, R. W.	" " "	..	19 96	2 88	977 16	
Weir, J.	" " "	......	19 96	2 88	977 16	
Hobbs, G. N.	" " "	....	17 82	2 88	871 80	
Wardell, R. S. R.	" " "	....	31 25	2 88	858 37	
Logan J.	" 2nd " "	......	16 96	2 88	830 16	
Amor, W.	" " " "	..	16 96	2 88	830 16	
Mackay, G. W.	" 3rd " "	....	15 00	2 88	732 12	
Hayhurst, T. H.	" " " "	38 42	......	2 88	727 45	
Bishop, J. B.	" " " from May 9, 1899, to June 30, 1900	30 72	....	2 88	580 90	
Blackman Chas.	" Messenger for year	25 04	....	....	474 96	
	Salaries	94 18	360 32	70 56	18,718 19	
	Contingencies	...	....	....	329 17	
						19,047 36
	Kingston.					
Dickson, C. T.	Salary as Collector for year	......	30 42	7 20	1,484 88	
Earle, R. H.	" Special Class Exciseman from July 1 to February 28	...	16 00	2 88	781 12	
Grimason, T.	" Deputy Collector for year	......	24 00	3 60	1,172 40	
Hanley, A.	" Asst. Accountant "	......	19 96	2 88	977 16	
McFarland, C. D.	" 1st Class Exciseman "	....	19 96	2 88	977 16	
Lyons, E.	" " "	......	19 96	2 88	977 16	
Browne, G. W.	" 2nd " "	...	16 96	2 88	830 16	
O'Donnell, J.	" 3rd " "	.....	15 00	2 88	732 12	
Fahey, E.	" " " "	......	12 00	2 88	585 12	
	Salaries	...	174 26	30 96	8,517 28	
	Contingencies	......	....	....	723 77	
						9,241,05
	London.					
Alexander, T.	Salary as Collector for year	......	36 00	7 20	1,756 80	
Spereman, J. J.	" Special Class Exciseman for year	.....	31 96	4 32	1,563 72	
Davis, T. G.	" Deputy Collector for year	......	30 00	3 60	1,466 40	
Conway, B. J.	" Special Class Exciseman from July 1 to Feb. 28	......	20 00	2 88	977 12	
McSween, J.	" 1st Class Exciseman for year	....	19 96	2 88	977 16	
Hicks, W. H.	" Deputy Collector "	....	19 96	4 68	975 36	
Coles, F. H.	" Accountant "	......	19 96	4 32	975 72	
Girard, I.	" 1st Class Exciseman from July 1 to Oct. 31, and from Mar. to June 30	......	13 32	0 48	652 88	
Stewart, J.	" 1st Class Exciseman for year	......	19 96	0 48	979 56	
Lee, E.	" " "	.....	19 96	2 88	977 16	
Wilson, D.	" Asst. Accountant "	...	19 96	2 88	977 16	
Webbe, C. E. A.	" 2nd Class Exciseman "	....	16 96	2 16	830 88	
Tracey, J. P.	" " "	.....	16 96	2 88	830 16	
Foster, H.	" " "	.....	27 53	2 88	757 09	
Whitehead, J. P.	" Deputy Collector "	32 48	....	0 48	617 04	
Talbot, J.	" 3rd Class Exciseman "	31 44	....	2 88	595 68	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	London.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Berry, H. L.	Salary as Probationary Exciseman from July 6 to Jan. 4, and 3rd Class Exciseman from Jan. 5 to Mar. 31	19 58	......	2 12	370 45	
Davis, J.	" 2nd Class Exciseman from Aug. 26 to June 30	.....	14 42	2 45	707 42	
Boyle, P.	" 1st Class Exciseman from April 1 to June 30	Insurance. 17 94	7 52	0 72	223 86	
	Insurance	17 94	....	....	....	
	Salaries	83 50	334 43	53 17	17,211 62	
	Contingencies	..	....	....	1,167 43	18,379 05
	Ottawa.					
Costigan, H. A.	Salary as Collector for year	79 96	....	7 20	1,512 84	
Neville, C.	" Deputy Collector from July 1 to Jan. 31	...	....	2 10	655 55	
Slattery, R.	" 1st Class Exciseman from July 1 to Oct. 31, and from Dec. 1 to June 30	....	19 92	2 88	893 83	
McGuire, T.	" Deputy Collector for year	48 29	....	3 12	914 68	
Waller, J.	" 3rd Class Exciseman from July 1 to Oct. 31	......	5 00	0 96	244 04	
Doyle, J. E. H.	" 3rd Class Exciseman for year	....	15 00	2 88	732 12	
Hinchey, E. H.	" " "	...	12 00	2 88	585 12	
Bennett, J.	" Deputy Collector from Mar. 8 to June 30	14 15	....	0 90	268 01	
	Salaries	142 40	51 92	22 92	5,806 19	
	Contingencies	.....	......	....	299 41	6,105 60
	Owen Sound.					
Graham, W. J.	Salary as Collector for year	...	24 00	3 60	1,172 40	
Nichols, J. T.	" Deputy Collector for year	...	19 96	2 88	977 16	
Johnson, J. J.	" 2nd Class Exciseman "	......	16 96	0 96	832 08	
Chisholm, W. N.	" Deputy Collector "	..	16 96	2 88	830 16	
Blyth, A.	" 3rd Class Exciseman "	34 13	....	2 88	645 49	
	Salaries	34 13	77 88	13 20	4,457 29	
	Contingencies	.....	....	....	640 92	5,098 21
	Perth.					
McLenaghan, N.	Salary as Collector for year	69 00	......	7 20	1,303 80	
Mason, F.	" Special Class Exciseman for year	...	30 00	4 32	1,465 68	
Goodman, A. W.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Clarke, T.	" Deputy Collector " "	30 00	......	2 88	567 12	
Rowan, W. E.	" " " "	19 96	....	2 88	377 16	
Egan, W.	" " " "	....	....	2 88	397 08	
George, J.	" " " "	10 04	......	2 88	187 08	
Mills, A. E.	" " from July 1 to Feb. 28	4 96	....	1 20	93 84	
Earle, R. H.	" Special Class Exciseman from Mar. 1 to June 30	......	8 00	1 44	390 56	
	Salaries	133 96	57 96	28 56	5,759 48	
	Contingencies	....	....	....	510 70	6,270 18

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Peterborough.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Hall, J. J	Salary as Collector for year		24 00	3 60	1,172 40	
Cahill, Thos.	" Deputy Collector from July 1 to May 31		18 26	3 30	895 07	
Howden, R	" Deputy Collector for year		16 04	2 88	781 08	
Bickle, J. W.	" " "		13 96	2 88	683 16	
Knowlson, J. B.	" " "		13 96	2 88	683 16	
	Salaries		86 22	15 54	4,214 87	
	Contingencies				153 15	
						4,368 02
	Port Arthur.					
Ironside, G. A.	Salary as Collector for year		20 00	3 60	976 40	
	Contingencies				68 58	
						1,044 98
	Prescott.					
Dumbrille, J.	Salary as Collector for year		36 00	7 20	1,756 80	
Gerald, W. H.	" Special Class Exciseman for year		30 00	4 32	1,465 68	
Keilty, T.	" Deputy Collector for year		25 96	3 60	1,270 44	
Walsh, D. J.	" Special Class Exciseman from July 1 to May 31		22 00	3 96	1,074 04	
Macdonald, A. B.	" 1st Class Exciseman, from July 1 to March 31, and Special Class Exciseman from April 1 to June 30		20 94	3 24	1,025 79	
Marshall, F.	" Exciseman for year		16 96	2 88	830 16	
Keeler, G. S.	" 2nd Class Exciseman for year		16 96	2 88	830 16	
Wood, J. A.	" Deputy Collector for year			2 88	797 04	
Ferguson, J.	" 3rd Class Exciseman "		15 00	2 88	732 12	
Johnston, G. E.	" " " "		15 00	2 88	732 12	
	Salaries		198 82	36 72	10,514 35	
	Contingencies				367 66	
						10,882 01
	Stratford.					
Caven, A.	Salary as Collector for year		31 96	3 60	1,564 44	
Rennie, G.	" Deputy Collector for year		24 00	3 60	1,172 40	
Dingman, N. J.	" Exciseman from July 1 to 9		0 58	0 10	28 35	
Clark, A. F.	" Accountant for year		19 96	0 72	979 32	
Egener, A.	" 1st Class Exciseman for year		19 96	2 88	977 16	
Waller, J.	" 3rd Class Exciseman from Nov. 1 to June 30		10 00	1 92	488 08	
	Salaries		106 46	12 82	5,209 75	
	Contingencies				927 49	
						6,137 24
	St. Catharines.					
Hesson, C. A.	Salary as Collector for year		24 00	7 20	1,168 80	
Harris, J. G.	" Deputy Collector for year		34 96	1 44	953 60	
Milliken, E.	" 2nd Class Exciseman "		16 96	2 88	830 16	
Schram, R. L. H.	" 3rd " " "		23 52	2 88	648 60	
	Salaries		99 44	14 40	3,611 16	
	Contingencies				942 82	
						4,553 98

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	Toronto.					
Stratton, W. C ..	Salary as Collector from July 1 to Dec. 31	....	21 96	7 20	1,070 82	
Gerald, C	" Special Class Exciseman for year	....	31 96	4 32	1,563 72	
Dudley, W. H ...	" Special Class Exciseman from July 1 to Jan. 2 and from Jan. 16 to Mar. 31	...	23 94	3 24	1,112 58	
Henderson, W ...	" Deputy Collector for year	......	30 00	3 60	1,466 40	
Blair, J. B	" Accountant for year	......	28 04	4 32	1,367 64	
Frankland, H. R.	" Deputy Collector from July 1 to Dec. 31, and Collector from Jan. 1 to June 30	77 46	......	1 20	1,471 32	
Iler, B	" Special Class Exciseman from July 1 to Dec. 31, and Deputy Collector from Jan. 1 to June 30	...	29 40	5 76	1,438 96	
Metcalf, W. F ...	" Special Class Exciseman for year	...	24 00	4 32	1,171 68	
Boomer, J. B	" Asst. Accountant for year	...	24 17	2 88	1,181 54	
Boyd, S. I.	" Deputy Collector "	...	24 00	2 88	1,173 12	
Dick, J. W	" Special Class Exciseman for year	......	24 00	4 32	1,171 68	
Shanacy, M	" Deputy Collector for year	......	22 04	2 88	1,075 08	
Coleman, C	" " "	......	19 96	2 88	977 16	
Evans, G. T	" 1st Class Exciseman from July 1 to Aug. 18, and Special Class Exciseman from Aug. 19 to June 30	....	23 45	4 13	1,146 06	
Helliwell, H. N ..	" 1st Class Exciseman for year	......	19 96	2 88	977 16	
McDonald, J. A .	" " " from July 1 to Nov. 30	......	8 30	....	408 35	
O'Leary, T. J	" 1st Class Exciseman for year	......	19 96	0 24	979 80	
Flynn, D. J	" " " "	......	19 96	2 88	977 16	
Jamieson, R. C ..	" " " from July 1 to Mar. 31, and Special Exciseman from April 1 to June 30	....	20 94	3 24	1,025 79	
Graham, W. T ..	" 1st Class Exciseman for year	..	19 96	2 88	977 16	
Doyle, B. J	" " " "	.....	19 96	2 88	977 16	
Brennan, D. J ...	" " " "	.....	19 96	2 88	977 16	
Dodds, E. W ..	" " " from July 1 to May 31	.....	16 50	1 41	807 06	
Cook, W. R	" 1st Class Exciseman for year	.....	19 17	2 88	934 20	
Howard, W.W.S.	" " " from July 1 to Feb. 28, and from May 1 to June 30	..	17 49	2 64	776 67	
Hurst, L. B	" 1st Class Exciseman for year	...	18 31	2 88	892 56	
Barber, J. S. ...	" 2nd " " "	....	16 96	2 64	830 40	
Murray, A. S. E.	" " " "	......	16 96	2 64	830 40	
Dager, H. J	" Deputy Collector "	40 01	......	2 88	757 08	
Adams, J. S	" 3rd Class Exciseman "	......	15 00	2 88	732 12	
Jones, A	" " " "	.....	15 00	2 88	732 12	
Coulter, A.	" " " "	.....	24 11	2 88	663 01	
Pringle, J	" Deputy Collector from July 1 to Dec. 1	4 98	....	1 44	93 54	
Boyd, J. F. S	" Probationary Exciseman from July 1 to Dec. 31, and 3rd Class Exciseman from Jan. 1 to June 30	......	17 94	2 88	529 14	
Elliott, T. H	" Deputy Collector from Aug. 1 to June 30	7 95	....	2 64	149 40	

Appendix B.—No. 1.—Details of Excise Expenditure, 1899-1900.—*Con.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amount paid.	Total amounts paid.
	Toronto—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Falconer, R. H.	Salary as Probationary Exciseman from Jan. 25 to June 30	10 87	....	1 20	205 63	
Graham, A. L.	" Probationary Exciseman from Feb. 12 to June 30	9 58	....	0 96	181 39	
	Salaries	150 88	653 36	107 57	33,802 22	
	Contingencies	....	....	....	1,776 64	
						35,578 86
	Windsor.					
Kenning, J. H.	Salary as Collector for year	....	43 96	14 40	2,141 64	
Ramon, P.	" Deputy Collector from July 1 to May 31	......	27 50	6 60	1,340 90	
Bouteiller, G. A.	" Special Class Exciseman for year	....	31 96	4 32	1,563 72	
Crowe, W.	" Accountant for year	......	28 04	4 32	1,367 64	
Dunlop, C.	" Deputy Collector for year	....	24 00	3 60	1,172 40	
Gow, J. E.	" Special Class Exciseman for year	......	24 00	4 32	1,171 68	
Brennan, J.	" Accountant for year	....	22 04	4 32	1,073 64	
Allen, G. A.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Marcon, F. E.	" 1st " "	......	19 96	2 88	977 16	
Thomas, R.	" 1st " "	......	17 82	2 88	871 80	
Bayard, G. A.	" 1st " "	....	17 82	2 88	871 80	
Jubenville, J. P.	" 2nd " "	....	16 96	2 88	830 16	
Falconer, J.	" 3rd " "	......	15 00	2 88	732 12	
Keogh, P. M.	" 3rd " "	....	15 00	2 88	732 12	
Crotty, J.	" 3rd " "	.....	15 00	2 88	732 12	
Cahill, J. W.	" 3rd " "	....	15 00	2 88	732 12	
Belleperche, A. J. E.	" Deputy Collector "	30 00	....	2 88	567 12	
Scott, M. W.	" " from July 1 to Oct. 31	...	....	0 96	65 68	
Girard, I.	" 1st Class Exciseman from Nov. 1 to Feb. 28	......	6 64	....	326 68	
Conway, B. J.	" Special Class Exciseman from March 1 to June 30	......	10 00	1 44	488 56	
	Salaries	30 00	370 66	73 08	18,736 22	
	Contingencies	......	....	....	935 01	
						19,671 23
	Joliette.					
Basinet, L.	Salary as Acting Collector for year	......	....	3 60	596 40	
Taylor, G. W.	" Special Class Exciseman for year	......	28 04	4 32	1,367 64	
Marion, J. E. E.	" 3rd Class Exciseman for year	37 44	....	2 88	709 68	
Moreau, A.	" Deputy Collector "	30 00	....	3 60	566 40	
Richard, J. B. T.	" " from July 1 to April 30	12 50	....	3 00	234 50	
	Salaries	79 94	28 04	17 40	3,474 62	
	Contingencies	......	....	....	162 52	
						3,637 14
	Montreal.					
Lawlor, H.	Salary as Collector for year	....	43 96	14 40	2,141 64	
Macdonald, D.	" Deputy Collector for year	......	30 00	7 20	1,462 80	
Toupin, F. X. J. A.	" " "	...	30 00	7 20	1,462 80	
Lecours, H. T.	" Accountant "	......	28 04	4 32	1,367 64	
Caven, W.	" Special Class Exciseman for year	....	25 96	4 32	1,269 72	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899–1900—*Con.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Montreal—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Fox, J. D.	Salary as Assistant Accountant for year	....	25 20	2 88	1,231 92	
Forest, E. R.	" Cashier for year	......	25 96	7 20	1,266 84	
Fox, T.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Villeneuve, J.	" 1st " "	....	19 96	2 88	977 16	
Scullion, W. J.	" 1st " "	......	19 96	2 88	977 16	
MacIntyre, D.	" 1st " "	......	19 96	2 88	977 16	
Hawkins, A. C.	" 1st " "	....	19 54	2 88	955 08	
Lane, T. M.	" 1st " "	......	19 17	2 88	934 20	
Bulmer, W.	" 2nd " "	....	16 96	2 88	830 16	
Malo, T.	" 2nd " "	....	16 96	2 88	830 16	
Dumouchel, L.	" 2nd " "	......	16 96	2 88	830 16	
Courtney, J. J.	" 2nd " "	....	16 96	2 88	830 16	
Verner, F.	" 2nd " "	......	16 96	2 88	830 16	
Dixon, H. G. S.	" 2nd " "	......	16 96	2 88	830 16	
Manning, J.	" 2nd " "	......	16 96	2 88	830 16	
Scullion, P. J.	" 2nd " "	......	15 00	2 88	732 12	
Millier, E.	" 3rd " "	......	15 00	2 88	732 12	
Baby, Jos.	" 3rd " "	......	15 00	2 88	732 12	
Panneton, G. E.	" 3rd " "	..	15 00	2 88	732 12	
Pinsonnault, A.	" 3rd " "	37 44	......	2 88	709 68	
Laporte, G.	" 3rd " "	......	15 00	2 88	732 12	
Watkins, J. A.	" 3rd " from July 1 to May 31	.....	13 75	2 64	671 11	
Costigan, J. J.	" 3rd Class Exciseman for year	......	15 00	2 88	732 12	
Codd, H. J. S.	" 3rd " "	....	15 00	2 88	732 12	
O'Flaherty, E. J.	" 3rd " "	......	15 00	2 88	732 12	
Brabant, J. B. G. N.	" 3rd " "	....	15 00	2 88	732 12	
Bélair, A. P.	" 3rd " "	......	15 00	2 88	732 12	
Ryan, W.	" 3rd " "	37 44	......	2 88	709 68	
Mainville, C. P.	" 3rd " "	.....	15 00	2 88	732 12	
Renaud, A. H.	" 3rd " "	....	24 11	2 88	663 01	
Desaulniers, J. E. A.	" 3rd " "	32 99	......	2 88	624 13	
Andrews, A. A.	" 2nd " "	...	26 16	2 88	720 96	
Comte, L. A. A. J.	" 3rd " "	......	21 78	2 88	597 84	
Laurier, J.	" Probat'y Exciseman from July 1 to Sept. 30, and 3rd Class Exciseman from Oct. 1 to June 30	28 73	....	2 88	543 36	
Bruyère, H. P.	" Deputy Collector for year	25 65	....	3 60	484 38	
Snowdon, J. W.	" Probationary Exciseman from July 1 to Dec. 11, and 3rd Class Exciseman from Dec. 12 to June 30	27 75	....	2 88	524 83	
Fortier, V.	" Deputy Collector for year	30 00	....	3 60	566 40	
St. Michel, F. X.	" " "	21 48	....	3 60	408 21	
Kearney, D. J.	" Probationary Exciseman from Dec. 1 to May 31, and 3rd Class Exciseman from June 1 to 30	14 98	....	1 44	283 54	
	Salaries	256 46	697 19	154 56	37,372 85	
	Contingencies	...	....	....	3,046 50	
						40,419 35
	Quebec.					
LaRue, G.	Salary as Collector for year	.....	36 00	7 20	1,756 80	
Cahill, J. H.	" Deputy Collector for year	......	......	3 60	1,296 36	
Coleman, J. J.	" 1st Class Exciseman "	......	19 96	2 88	977 16	
Rouleau, J.	" 3rd Class " "	......	15 00	2 88	732 12	
LeMoine, J.	" " " "	......	15 00	2 88	732 12	

Appendix B.—No. 1.—Details of Excise Expenditures, 1899–1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total Amounts paid.
	Quebec—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Bourget, O.	Salary as 3rd Class Exciseman for year	......	15 00	2 88	732 12	
Lépine, L.	" " " "	......	15 00	2 88	732 12	
Fahey, O.	" " " from July 1 to Nov. 30	.....	6 25	1 20	305 05	
Sexton, J.	" 3rd Class Exciseman from July 1 to Dec. 31	.....	7 50	1 44	366 06	
Bourassa, J.	" 3rd Class Exciseman for year	....	26 16	2 88	720 96	
LaRue, J. B. A.	" Deputy Collector "	......	31 45	3 60	864 95	
Beaulieu, J. B.	" 3rd Class Exciseman "	......	21 78	2 88	597 84	
Timmons, P.	" " " "	......	21 78	2 88	597 84	
Blair, A.	" Deputy Collector "	.....	....	3 60	196 32	
Pelletier, N. G.	" " "	25 04	....	3 60	471 36	
	Salaries	25 04	230 88	47 28	11,079 18	
	Contingencies	......	....	....	3,111 59	
						14,190 77
	Sherbrooke.					
Simpson, A. F.	Salary as Collector for year	......	29 40	0 60	1,440 00	
Quinn, J. D.	" Special Class Exciseman for year	......	24 00	4 32	1,171 68	
Murray, D.	" 1st Class Exciseman for year	......	19 96	2 88	977 16	
Chartier, E.	" Deputy Collector "	49 96	....	3 60	946 44	
Deland, A. N.	" " "	32 48	....	3 60	613 92	
Bowen, F. C.	" 3rd Class Exciseman "	33 71	....	0 24	641 05	
Rousseau, E. H.	" Deputy Collector "	25 04	....	0 60	444 36	
Grosbois, de C.B.	" " "	25 04	....	0 30	474 66	
	Salaries	166 23	73 36	16 14	6,739 27	
	Contingencies	.. .	....	....	1,201 25	
						7,940 52
	Sorel.					
Fortier, J. J. O.	Salary as Collector for year	......	20 00	3 60	976 40	
	Contingencies	......	....	....	55 18	
						1,031 58
	St. Hyacinthe.					
Boivin, C. A.	Salary as Collector for year	......	19 96	3 60	976 44	
Develuy, J. P.	" 3rd Class Exciseman for year	37 44	....	2 88	709 68	
Desmarais, F.	" Deputy Collector from Apr. 27, 1899 to June 30, 1900	5 82	....	3 60	108 31	
Têtreau, Jos.	" Deputy Collector from Jan. 17 to June 30	2 27	....	1 64	41 77	
	Salaries	45 53	19 96	11 72	1,836 20	
	Contingencies	......	....	....	189 50	
						2,025 70
	Three Rivers.					
Hébert, C. D.	Salary as Collector for year	......	24 00	3 60	1,172 40	
Duplessis, C. Z.	" 3rd Class Exciseman for year	......	15 00	2 88	732 12	
	Salaries	......	39 00	6 48	1,904 52	
	Contingencies	.....	....	....	185 25	
						2,089 77

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total Amounts paid.
	Victoriaville.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Poirier, J. N....	Salary as Deputy Collector from July 1 to Feb. 1, and Collector from Feb. 2 to June 30..	...	24 52	3 60	671 88	
Bousquet, J. O..	" Probationary Exciseman from Jan. 12 to June 30..	11 74	....	1 20	222 23	
	Salaries.............. ...	11 74	24 52	4 80	894 11	
	Contingencies............	......	....	....	441 37	
						1,335 48
	St. John.					
Atherton, R....	Salary as Collector for year	....	31 96	7 20	1,560 84	
Clark, J. A......	" Deputy Collector for year..	.....	24 00	3 60	1,172 40	
Belyea, T. H....	" Accountant for year.......	......	19 96	4 32	975 72	
McCloskey, J. R.	" 1st Class Exciseman for year	......	19 96	2 88	977 16	
Fitzpatrick, W.J.	" 1st " " ..	......	19 96	2 88	977 16	
Geldart, O. A....	" 1st " " ..	......	20 03	2 88	975 84	
Ferguson, J. C...	" 2nd " " .	.....	16 96	2 88	830 16	
Smyth, B. B.....	" 2nd " " ..	....	16 96	2 88	830 16	
Hill, A. M.......	" Deputy Collector " ..	.....	10 04	2 88	487 08	
Dibblee, W......	" " " .	..	3 72	2 88	293 40	
	Salaries.	......	183 55	35 28	9,079 92	
	Contingencies.............	......	....	......	601 68	
						9,681 60
	Halifax.					
Grant, H. H.....	Salary as Collector for year.........	......	36 00	7 20	1,756 80	
King, R. M......	" Deputy Collector for year..	......	25 96	3 60	1,270 44	
James, T. C......	" Accountant " ..	.....	19 96	4 32	975 72	
Carroll, D.......	" 1st Class Exciseman " ..	...	19 96	2 88	977 16	
Blethen, C. W...	" 1st " " ..	......	19 96	2 88	977 16	
Wainwright, F.G.	" 2nd " " ..	......	16 96	0 24	832 80	
Hubley, H. H....	" 2nd " " ..	.....	16 96	2 88	830 16	
Tompkins, P.....	" 3rd " " ..	.....	15 00	2 88	732 12	
Hagarty, P	" 3rd " " ..	....	15 00	2 88	732 12	
Munro, H. D....	" 3rd " " ..	....	15 00	2 88	732 12	
Gorman, A. M...	" 3rd " " ..	.....	12 60	2 88	614 52	
	Salaries.............. ...	......	213 36	35 52	10,431 12	
	Contingencies	.....	....	....	610 42	
						11,041 54
	Pictou.					
Fraser, P..	Salary as Collector for year........	.....	19 96	3 60	976 44	
McDonald, A. J..	" Deputy Collector for year..	30 43	....	2 88	575 34	
	Salaries.....	30 43	19 96	6 48	1,551 78	
	Contingencies..	......	....	....	271 10	
						1,822 88
	Charlottetown.					
Nash, S. C......	Salary as Collector for year.........	.....	24 00	3 60	1,172 40	
Moore, Theo....	" Deputy Collector for year..	.....	19 96	2 88	977 16	
	Salaries........	. .	43 96	6 48	2,149 56	
	Contingencies..	.....	....	....	104 18	
						2,253 74

Appendix B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total Amounts paid.
	Winnipeg.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Gosnell, T. S....	Salary as Collector for year........	....	37 80	7 20	1,845 00	
Watson, W. W..	" Deputy Collector for year..	......	....	3 60	1,296 36	
Hawkins, W. L..	" Accountant " ..	.....	24 00	3 24	1,172 76	
Code, A.........	" " " ..	.....	25 96	4 32	1,269 72	
Girdlestone, R. J. M	" Deputy Collector " ..	......	19 96	2 88	977 16	
Saucier, X......	" 1st Class Exciseman " ..	......	17 82	2 88	871 80	
Sparling, J. W...	" Deputy Collector " ..	40 04	....	2 88	757 08	
Larivière, A. C..	" 2nd Class Exciseman " ..	....	27 53	2 88	757 09	
Verner, T. H....	" " " from July 1 to Dec. 31, and 1st Class Exciseman from Jan. 1 to June 30......	......	27 90	2 88	769 20	
O'Meara, F. M...	" Deputy Collector from July 1 to Aug. 31.......	5 36	....	0 72	101 66	
Conklin, W. M..	" 3rd Class Exciseman for year	30 72	....	2 88	581 40	
Barnes, G.......	" Deputy Collector " ..	26 09	....	2 88	493 46	
Ross, H. E......	" " " ..	......	11 92	2 88	385 20	
Jameson, S. B...	" " " ..	......	9 00	2 88	288 12	
McNiven, J. D..	" " " ..	12 52	....	2 88	234 60	
Long, W. H. ...	" Probationary Exciseman from Dec. 14 to June 13, and 3rd Class Exciseman from June 14 to 30......	13 91	....	1 44	263 50	
	Salaries....................	128 64	201 89	49 32	12,064 11	
	Contingencies..............	......	....	....	1,871 27	
						13,935 38
	Calgary.					
Thomas, P.. . . .	Salary as Acting Collector for year..	......	22 04	3 60	1,074 36	
Fletcher, R. W..	" Deputy Collector " ..	30 00	....	2 88	567 12	
Ives, G. C......	" " " ..	19 96	....	2 88	377 16	
Osborne, F. A....	" " " ..	......	11 92	2 88	385 20	
	Salaries...............	49 96	33 96	12 24	2,403 84	
	Contingencies............. ..	......	....	....	851 39	
						3,255 23
	Vancouver.					
Miller, J. E......	Salary as Collector for year...	......	30 00	3 00	1,467 00	
Parkinson, E. B..	" Deputy Collector for year..	49 97	....	0 60	949 43	
Wolfenden, Wm..	" " " ..	34 96	....	3 60	661 44	
Bishop, A........	" " " ..	30 00	....	3 60	566 40	
Cargill, Wm.... .	" " " ..	31 44	....	3 60	594 96	
Swannell, F. W..	" " " ..	30 00	....	3 60	566 40	
Howell, Thos....	" " " ..	19 96	....	1 80	378 24	
Stevens, D. B....	" " " ..	19 96	..... .	3 60	376 44	
Parson, C. H ..	" " " ..	10 04	... .	3 60	186 36	
McCutcheon, H..	" " from Sept. 7 to June 30..	24 50	....	2 94	462 56	
McCraney, H. P.	" Deputy Collector from Sept. 1 to June 30............	33 30	....	3 00	630 31	
	Salaries..	284 13	30 00	32 94	6,839 54	
	Contingencies..............	......	....	....	3,940 90	
						10,780 44

APPENDIX B.—No. 1.—Details of Excise and Expenditures, 1899–1900—*Con.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Victoria.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Jones, R.	Salary as Collector for year	....	30 00	7 20	1,462 80	
Henwood, G.	" Exciseman "	....	19 04	2 88	928 08	
O'Sullivan, D.	" Deputy Collector for year	....	33 00	3 60	908 40	
Ridgman, A. H.	" 3rd Class Exciseman "	......	25 19	2 88	691 93	
McAloney, J. A.	" Deputy Collector "	15 00	.....	3 60	281 40	
	Salaries	15 00	107 23	20 16	4,272 61	
	Contingencies	......	....	......	930 23	
						5,142 84
	DISTRICT INSPECTORS.					
	Ontario.					
Dingman, N. J.	Salary from July 10 to June 30	......	35 12	8 78	1,712 55	
	Contingencies	......	....	....	905 50	
						2,618 05
Morrow, J.	Salary from July 1 to Dec. 31	......	24 96	4 50	1,220 52	
Stratton, W. C.	" Jan. 1 to June 30	......	24 00	4 50	1,171 50	
	Salaries	.....	48 96	9 00	2,392 02	
	Contingencies	......	....	....	259 92	
						2,651 94
Gow, J.	Salary for year	..	50 00	9 00	2,441 00	
	Contingencies	......	....	......	457 72	
						2,898 72
	Quebec.					
Beauchamp, J. P.	Salary for year	...	40 00	9 00	1,951 00	
	Contingencies	.....	....	....	51 50	
						2,002 50
LeMoine, Sir J. M.	Salary from July 1 to 31	.....	....	0 75	207 58	
Rinfret, Dr. C. I.	" Aug. 25 to June 30	106 45	....	7 66	2,016 23	
	Salaries	106 45	....	8 41	2,223 81	
	Contingencies	....	....	......	177 00	
						2,400 81
	New Brunswick.					
Burke, T.	Salary for year	......	50 00	9 00	2,441 00	
	Contingencies	......	....	....	635 37	
						3,076 37
	Manitoba.					
Barrett, J. K.	Salary for year	.....	50 00	9 00	2,441 00	
	Contingencies	......	....	......	943 50	
						3,384 50
	British Columbia.					
Gill, Wm.	Salary for year	.....	50 00	9 00	2,441 00	
	Contingencies	.....	......	....	1,048 85	
						3,489 85
	Chief Inspector.					
Gerald, W. J.	Contingencies	.....	......	....	....	332 41
	Inspectors of Bonded Factories.					
Morrow, John; Stratton, W. C.	Contingencies	......	......	....	....	82 31

APPENDIX B.—No. 1.—Details of Excise Expenditure, 1899-1900—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Excise Contingencies.	$ cts.	$ cts.
Potvin, Napoléon	Express and freight charges	122 30	
Westman, Thomas	Board allowance for $2\frac{3}{4}$ months while on duty at Ottawa	99 00	
Pritchard-Andrews Co., The	Steel cutting rollers, stamps, daters, stencils, and repairs	248 70	
Graves Bros	Nails, locks, hooks, glass, wire, &c	22 92	
Bailey, George	Brackets, repairs to pyrometers, 6 copper pyrometers, repairing locks, &c	314 56	
Parr, J. A	Lumber	22 46	
Whitehead, Mrs. J	Cleaning safe and storerooms	78 25	
Registrar Exchequer Court	6 writs of assistance	17 40	
Eimer & Amend	Cork borers, flasks	12 07	
British American Bank Note Co	To pay for stamps and labels supplied	3,152 28	
American Bank Note Co	" "	31,847 72	
Topley, Wm. J	Plates, mounts, &c	5 10	
Fréchette, Achille	Technical proof reading and translation	100 00	
Canadian Express Co	Express charges on box of hydrometers and thermometers from England	9 69	
Gerald, Charles	Travelling expenses from Toronto to Berthier and return on departmental duty	115 12	
Lymans, Sons & Co	Flasks, bottles, bunsen burners	14 52	
Storey, D	18 wooden boxes	17 70	
Butterworth & Co	Nail pullers, plyers	2 50	
Chater, Edwin	100 thermometer guards	35 00	
Canada Rubber Co., The	Rubber tubing	7 00	
Oertling, L	Repairing hydrometers, &c	220 48	
	Total General Contingencies		36,464 77
	Law Costs.		
Lavery, J.I	Law costs in *re* Regina *vs.* John Morin	142 97	
	" Regina *vs.* Jos. Thivièrge	22 40	
			165 37
Paradis, E. Z	" Regina *vs.* A. Longtin	40 25	
	" Regina *vs.* R. Poutre	40 00	
	" Regina *vs.* N. Lord	41 50	
	" Regina *vs.* C. Poutre	40 00	
	" Regina *vs.* C. Meunier	40 00	
	" Regina *vs.* J. Audette	40 00	
	" Regina *vs.* C. Benoit	40 70	
	" Regina *vs.* A. Longtin	83 80	
			366 25
Colton & Goodman	" Regina *vs.* Gibson		4 23
Hays, R. S	" Regina *vs.* Ellise & Kave		15 00
McLean, A. K	" Regina *vs.* J. Anderson	10 00	
	" Regina *vs.* Hall	8 00	
			18 00
Gouin, Lomer	" Regina *vs.* Myre	75 08	
	" Regina *vs.* J. L. Leclaire	24 53	
	" Regina *vs.* H. F. Bellemare	10 00	
	" Regina *vs.* Gauvin	15 00	
	" Regina *vs.* C. Rochon	45 43	
	" Regina *vs.* Lefebvre	67 93	
	" Regina *vs.* P. Barbeau	94 95	
	" Regina *vs.* Chapleau	36 43	
	" Regina *vs.* Jos. Germain	29 03	
	" Regina *vs.* B. Laporte	29 03	
	" Regina *vs.* Jos. Lafleur	74 58	

Appendix B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Con.*

To whom paid.	Service.	Amounts Paid.	Totals.
	Law Costs—Continued.	$ cts.	$ cts.
Gouin, Lomer	Law costs in *re* Regina *vs.* A. Charest	10 00	
	" Regina *vs.* Bissonnette	20 00	
	" Regina *vs.* F. Bissonnette	10 00	
	" Regina *vs.* Bissonnette	20 00	
	" Regina *vs.* C. Gauthier	20 00	
	" Regina *vs.* G. Bertrand	20 00	
	" Regina *vs.* I. Malartre	24 10	
	" Regina *vs.* P. Pelletier (to pay for action not defended)	10 00	
	" Regina *vs.* G. Levasseur	10 00	
	" Regina *vs.* J. Lafleur	184 30	
	Expenses in Seizure No. 1046 (Montreal)	10 00	
	" " No. 979 "	20 00	
			860 39
Grenier & Tessier	Law costs in *re* Regina *vs.* Nourri	26 30	
	Constables expenses in *re* Regina *vs.* Nourri	42 34	
	Law costs in *re* Regina *vs.* Donville	24 20	
			92 84
Ross, W. B	Law costs in *re* Regina *vs.* D. McDonald	5 00	
	" Regina *vs.* A. Corbett	44 04	
	" Regina *vs.* J. P. Conway	29 76	
	" Regina *vs.* J. McDonald	61 22	
	" Regina *vs.* A. Corbett	40 15	
	" Regina *vs.* D McDonald	9 04	
	" Regina *vs.* Hunt *et al*	138 04	
			327 25
McLatchy, H. F	Law costs in *re* shortage of J. E. Baldwin, C.I.R., Bathurst, N.B		162 00
Teetzel, J. V	" Regina *vs.* J. McQuillan		50 00
Hibbard, F. W	" Regina *vs.* Charland		31 20
Cameron, M. G	" Regina *vs.* Tilt		4 02
Stevens, J. J	" Regina *vs.* A. H. Bell		10 00
MacDonnell, S	Professional services defending preventive officer D. Murray	20 00	
	Law corts in *re* Regina *vs.* J. McDonald	2 70	
			22 70
Pouliot, J. C	Law costs in *re* Regina *vs.* N. Plourde	35 20	
	" Regina *vs.* O. Thibault	27 20	
	" Regina *vs.* Brisbois	40 00	
	" Regina *vs.* M. Cloutier	87 90	
			190 30
Plamondon, J. D	Law costs in *re* Regina *vs.* A. Viens	18 30	
	" and constables fees in Seizure 75 (Sorel)	49 70	
	" in *re* Regina *vs.* O. Blain	20 00	
	Expenses in *re* Regina *vs.* O. Blain	25 60	
	" Regina *vs.* P. Burette	22 90	
	Law costs in *re* Regina *vs.* P. Burette	89 55	
	Expenses of Clerk of the Court in Seizure 75 Sorel	3 50	
			229 55
Chisholm, D. C	Law costs in *re* Regina *vs.* D. McDonald	40 00	
	" Regina *vs.* J. Fraser	10 00	
			50 00
Parsons, W. G	Professional services in *re* Regina *vs.* McNaughton		25 00
Martineau, P. R	Law costs in *re* Regina *vs.* A. Pelletier		98 70
Chagnon, W	Constables fees in *re* Regina *vs.* Donville		3 75
Asselin, L. N	Professional services in *re* Regina *vs.* Aubin		20 35
Daniels, O. T	" Regina *vs.* McNaughton		95 90
Broderick, J. S	Law costs in *re* Regina *vs.* D. Connolly	30 00	
	" Regina *vs.* A. Baird	10 00	
			40 00
Leduc, J. D	Law costs and disbursements in *re* Regina *vs.* H. Poulin	278 94	
	Law costs in *re* Regina *vs.* E. Leduc & Rose Anna Boyer	272 18	
			551 12

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Appendix B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Con.*

To whom paid.	Service.	Amounts Paid.	Totals.
	Law Costs—Continued.	$ cts.	$ cts.
Alarie, Ludger	Law costs in *re* Regina *vs.* L. Emond	20 00	
	" Regina *vs.* P. Savard	40 00	
	" Regina *vs.* X. Simard	20 00	
	" Regina *vs.* J. Tremblay	40 00	
	" Regina *vs.* J. Lacroix	52 75	
			172 75
McKeown, H. A.	Law costs in *re* Regina *vs.* F. L. Scribner	20 00	
	Expenses in *re* Regina *vs.* Geo. Grothers	77 81	
			97 81
Johnson, T.	Law costs in *re* Regina *vs.* A. McVicar		12 50
Langelier, Chas.	" Regina *vs.* I. Bois; " Regina *vs.* G. Bernard; " Regina *vs.* A Bérubé; " Regina *vs.* Fradet		234 90
Frankland, H. R	Constables fees and expenses in *re* Regina *vs.* A. McVicar	13 75	
	Constables fees and expenses in *re* Regina *vs.* Brown	14 45	
			28 20
Kerr, Macdonald, Davidson & Paterson	Law costs in *re* Regina *vs.* B. Baird		40 10
Lawlor, H. W.	" Regina *vs.* E. Tourangeau	14 52	
	" Regina *vs.* A. Garenne	24 00	
	" Regina *vs.* A. Mageau	20 00	
			58 52
Hanning, C. R	Professional services drawing lease between C. Nispel and department		3 50
Perrault, J. S	Law costs in *re* Regina *vs.* Houde		169 05
Duffy, Hon. H. T.	" Regina *vs.* P. Larose	20 00	
	" Regina *vs.* Cordeau	95 40	
			115 40
Cameron, J. D.	Magistrate and constables fees in *re* Regina *vs.* McEachren	7 35	
	" " Regina *vs.* D. McEachren	7 35	
			14 70
Mitchell, A. E.	Law costs in *re* Regina *vs.* Cantwell, Shea and Desrivières		158 34
Pelton, Sandford H.	" Regina *vs.* J. O'Neill and A. Doucette		100 00
Fontaine, R. E	" Regina *vs.* Z. Berthiaume		26 75
Cowper, T. D.	Professional services in *re* Regina *vs.* Histen		40 00
Chamberlin, R. G.	Expenses in Seizure 940, Montreal		77 30
Amyrault & Duffy	Law costs in *re* Regina *vs.* D. Westover		21 70
Wellbrenner, C.	Expenses in Seizure 75, Sorel		56 90
Grandpré, J. C. D. de	" Seizure 77, Sorel		35 50
Bailey, B. S.	" *re* Regina *vs.* Geo. Grothers		3 35
Ferguson, A.	" " "		7 00
Carter, W. D.	" " "		16 00
Desnoyers, M. C.	" Regina *vs.* Shea and Desjardins		51 15
Simard, A. H.	Professional services and expenses in *re* Regina *vs.* F. Desbiens	112 30	
	Magistrates fees, &c., in *re* Regina *vs.* F. Desbiens	65 40	
			177 70
Gagnon, Emile	Expenses in *re* Regina *vs.* F. Desbiens		225 00
Gauvreau, C.	Constables fees in Seizure 509, Quebec		10 00
LaRue, G.	Law costs in *re* Regina *vs.* J. Houde, L. Emond, F. Desbiens, J. Lacroix and J. Tremblay		157 75
Boily, Rev. Ed	Expenses in Seizure No. Gen. 4,595, Quebec		7 75
	Total, Law Costs		5,553 54

Appendix B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued.*

To whom paid.	Place of Residence.	Service.	Amounts paid.	Totals.
		Commission to Customs Officers.	$ cts.	$ cts.
Boyd, A.	Antigonish, N.S.	From July 1, 1898, to June 30, 1899	108 41	
McDonald, J. F.	New Glasgow, N.S.	" "	200 00	
Rose, George C.	Cascade City, B.C.	" "	97 68	
Gilpin, R. R.	Grand Forks, B.C.	" "	200 00	
Keay, W. S.	Cranbrook, B.C.	" "	109 35	
Watson, George	Collingwood, Ont.	" "	250 00	
Cameron, A. McK.	Meaford, Ont.	" "	200 00	
Britton, W. H.	Gananoque, Ont.	" "	150 00	
Anderson, J. J.	Sackville, N.B.	" "	150 00	
Street, A. F.	Fredericton, N. B.	" "	250 00	
Binney, J. W.	Moncton, N.B.	" "	250 00	
Park, W. A.	Newcastle, N. B.	" "	200 00	
Wallace, G. H.	Sussex, N. B.	" "	88 97	
Tennant, J. F.	Gretna, Man.	" "	150 00	
Clarke, C.	Fort Steele, B.C.	" "	61 50	
McPherson, J.	Kincardine, Ont.	" June 30, 1900	52 59	
Marsh, R. J. F.	Port Francis, Man.	" "	153 74	
Hamilton, A. G.	North Sydney, N.S.	" Feb. 28, 1899	100 00	
Baldwin, J. E.	Bathurst, N.B.	" March 31, 1899	55 11	
McPherson, J.	North Sydney, N.S.	March 1, 1898, to June 30, 1899	50 00	
Smith, A. H.	Sudbury, Ont.	July 1, 1899, to June 30, 1900	100 00	
McGuire, T. J.	Trenton, Ont.	" "	198 20	
Ross, Walter J.	Picton, Ont.	" "	144 89	
Valleau, A. S.	Deseronto, Ont.	" "	133 39	
Anderson, T. E.	Napanee, Ont.	" "	248 20	
Stanley, T. D.	St. Mary's, Ont.	" "	198 20	
Beauchesne, P. C.	Paspébiac, Que.	" "	10 45	
Kavanagh, A. J.	Gaspé, Que.	" "	51 99	
Brodeur, S. A.	Valleyfield, Que.	" "	248 20	
Roberts, J. E.	Toronto, Ont.	" "	10 80	
Rawlings, E.	Montreal, Que.	" "	5 40	
Griffin, R. J.	"	" "	1 80	
Leahy, David	Bathurst, N.B.	April 1, 1899, to Nov. 21, 1899	163 99	
Plummer, H.	Sault Ste. Marie, Ont.	July 1, 1898, to Aug. 8, 1899	221 05	
Duck, John	Ridgetown, Ont.	Dec. 8, 1898, to Oct. 10, 1899	171 94	
Cutchon, H. M.	Nakusp, B.C.	Dec. 19, 1898, to June 30, 1899	150 00	
McDonald, R. B.	Rossland, B.C.	April 1, 1899, to Aug. 31, 1899	250 00	
Blair, H. C.	Truro, N.S.	July 1, 1899, to June 30, 1900	200 00	
Shiles, C.	Revelstoke, B.C.	Nov. 5, 1899, to April 6, 1900	114 66	
		Total Commission to Customs Officers		5,500 51
		Commission on Tobacco Stamps.		
Forest, Z.	L'Epiphanie, Que.	Allowance of 5 p. c. on sale of stamps	24 63	
Paquette, O.	St. Eustache, Que.	" "	38 04	
Roy, J.	St. Alexis, Que.	" "	0 50	
		Total		63 17

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1899-1900—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	Duty-pay.	$ cts.	$ cts.
Gerald, Charles.	From July 1, 1899, to June 30, 1900	200 00	
Jamieson, R. C.	" "	150 00	
O'Leary, T. I.	" "	100 00	
Flynn, D J.	" "	100 00	
Brennan, D. J	" "	100 00	
Hurst, L. B.	" "	100 00	
Doyle, B. J	" "	100 00	
Bouteiller, G. A	" "	200 00	
Gow, John E.	" "	150 00	
Brennan, J.	" "	100 00	
Thomas, R.	" "	100 00	
Bayard, G. A	" "	100 00	
Marcou, F. E	" "	100 00	
Cahill, J. W.	" "	100 00	
Keogh, P. M.	" "	100 00	
Falconer, J. E.	" "	100 00	
Crotty, John	" "	100 00	
Allen, G. A	" "	150 00	
Howie, A	" "	150 00	
Bish, P	" "	100 00	
Kilroy, E. T	" "	100 00	
Standish, J. G.	" "	100 00	
McCoy, W.	" "	150 00	
Baby, W. A. D.	" "	100 00	
Weir, James	" "	150 00	
Irwin, Robert	" "	100 00	
Gerald, W. H.	" "	150 00	
Walsh, D. J	" "	147 92	
Johnston, G. E.	" "	100 00	
Keeler, G. S.	" "	100 00	
Mason, F	" "	100 00	
Goodman, A. W	" "	100 00	
Taylor, G. W.	" "	150 00	
Moreau, Auguste	" "	100 00	
Caven, W	" "	200 00	
Millier, E	" "	150 00	
Scullion, W. J	" "	100 00	
Coleman, J. J	" "	150 00	
Lépine, L.	" "	75 00	
Cameron, D. M.	" "	200 00	
Quinn, J. D.	" "	150 00	
Malo, T.	" "	100 00	
Murray, David	" "	100 00	
Foster, H.	" "	100 00	
Weyms, C.	" "	100 00	
Traversy, F. X	" "	100 00	
Dawson, W	" "	125 00	
Iler, B	" to Dec. 31, 1899	100 00	
Ryan, W.	" to Aug. 31, 1899	8 33	
Murray, A. S. E.	" "	16 66	
Howard, W. S.	" to Feb. 28, 1900, and for months of May and June, 1900	83 34	
McFee, A. C.	From July 1, 1899, to Dec. 31, 1899, and from Feb. 2 to March 31, 1900	66 67	
Desaulniers, J. E. A.	From Sept. 1, 1899, to Dec. 31, 1899, and from April 1, 1900, to June 30, 1900	29 16	
O'Brien, E. C	From July 18, 1899, to Nov. 6, 1899	60 75	
Waller, John.	From Nov. 7, 1899, to June 30, 1900	130 10	
McDonald, A. B.	From June 16 to 30, 1900	6 25	
Dick, Walter	From Jan. 1, 1900, to June 30, 1900	100 00	
	Total duty-pay		6,299 18
	Grand total		385,948 86
	ADD—Printing	6,697 05	
	Stationery	1,039 53	
	Lithographing	547 00	
			8,283 58

Appendix B.—No. 1.—Details of Excise Expenditures, 1899–1900—*Con.*

To whom paid.	Service.	Amounts paid.	Totals.
	Statement No. 1—Concluded.	$ cts.	$ cts.
	Preventive Service:—		
	Salaries	2,116 61	
	Contingencies	9,020 33	
			11,136 94
	Authorized disbursements (less superannuation)		405,369 38
	Add—Balances due to Collectors, July 1, 1899	747 25	
	" by " June 30, 1900	367 75	
			1,115 00
			406,484 38
	Less—Balances due by Collectors, July 1, 1899	413 08	
	" to " June 30, 1900	49 08	
			462 16
	Actual disbursements agreeing with Statement No. 4, page 12		406,022 22

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 2.—Details of Fees paid to Cullers for the Fiscal Year ended June 30, 1900.

Office.	Article.	Names of Cullers.	Amounts paid.	Totals.
			$ cts.	$ cts.
Quebec	Square timber	Bergeron, Joseph	700 00	
	" "	Frederick, Antoine................	700 00	
	" "	Kelly, Edward........	700 00	
	" "	McKendry, Daniel	700 00	
	" "	McPeak, William............	700 00	
	" "	O'Brien, Martin O...	700 00	
				4,200 00

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 3.—Details of Cullers' Expenditures for the Fiscal Year ended June 30, 1900.

Office.	Names.	Nature of Service.	Deductions for Retirement.	Deductions for Superannuation.	Amounts paid.	Totals.	Grand Totals.
			$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Quebec	Patton, James	Supervisor of Cullers for the year		42 00	2,058 00		
	Whelan, W. F.	Specification Clerk		15 00	735 00		
	Gallagher, F.	"		15 00	735 00		
	Bellerive, Geo.	"		15 00	735 00		
	Harney, Thos.	Book-keeper and Cashier		15 00	735 00		
	Croteau, J. M.	Specification Clerk	37 44		712 56		
			37 44	102 00		5,710 56	
		Contingencies.					
	Foley, Mary	Charwoman			96 00		
	Duggan & Co., James	Night watchmen			35 00		
	Fitzgerald, Martin	Office boy			96 00		
	Harney, Thomas	Petty expenses			37 04		
	Post Office, Quebec	Rent of drawer			6 00		
	Hearn, John, Estate	Rent of office			625 00		
	Telephone Co., Bell	Rent of telephone			40 00		
	Rancour, Noël	Ice for season			15 00		
	Mulroney, W. J. & G.	Inks and mucilage			5 20		
	Holmes, Margaret	General house cleaning			42 00		
	Guérard, Louis	Placing double windows, &c			19 64		
	Turgeon, P. L.	Soaps, brooms, &c			10 70		
	Gas Co., Quebec	Gas consumed			21 52		
	Kane, J. R.	Plumbing			16 90		
	Canada Lumberman	Subscription to paper			1 00		
	Fitzgerald & Co., J.	Removing snow, &c			17 50		
	Chronicle Printing Co.	Subscription to paper			3 00		

Arnold, Thomas	Cartage of snow	25 00		
Routhier, A. C.	Repairing clocks	4 00		
Patton, James	Expenses to Montreal	19 02		
	Total contingences		1,135 52	
	Cullers' expenses.			
Bergeron, Joseph	Expenses	112 49		
Frédérick, Antoine	"	82 10		
Kelly, Edward	"	144 92		
McKendry, Daniel	"	152 89		
McPeak, William	"	62 02		
O'Brien, Martin	"	112 86		
	Total Cullers' expenses		667 28	
	Total expenditures			7,513 36
	Paid to retired Cullers.			
Jobin, Jacques	Superannuation	200 00		
Morisette, Joseph	"	200 00		
Demers, Louis	"	200 00		
Dorval, Philippe	"	200 00		
Walsh, William,	"	200 00		
Villeneuve, Jacques	"	200 00		
Bédard, Jérémie	"	200 00		
McNaughton, John	"	200 00		
Beaupré, Noël	"	200 00		
Frenette, Joseph	"	200 00		
Malone, James C.	"	200 00		
Duggan, Edward	"	200 00		
Gilchen, Thomas	"	200 00		
McInenly, Thomas	"	200 00		
Laflamme, Joseph	"	200 00		
Patry, Thomas	"	200 00		
Courchy, Charles	"	200 00		
Lynch, John	"	200 00		
Vachon, John B.	"	200 00		
Murphy, Thomas	"	200 00		
Demers, F. X.	"	200 00		
Munro, William	"	100 00		
Malone, Thomas	"	200 00		
Dorval, George	"	200 00		

Appendix B.—No. 3.—Details of Cullers' Expenditures for the Fiscal Year ended June 30, 1900—*Concluded.*

Office.	Names.	Nature of Service.	Amounts paid.	Totals.	Grand Totals.
		Contingencies—Concluded.	$ cts.	$ cts.	$ cts
Quebec—*Con*	Ferland, Pierre	Superannuation	200 00		
	Barsalo, E	"	200 00		
	McCormick, John	"	200 00		
	Morency, Denis	"	200 00		
		Total paid to retired Cullers			5,500 00
		Grand total			17,213 36
		Add—Printing		24 20	
		Stationery		26 10	
					50 30
		Authorized disbursements (less superannuation)			17,263 66
		Add—Balance due by Supervisor June 30, 1899			75 00
					17,338 66
		Less— " July 1, 1900			75 00
		Actual disbursements agreeing with Statement No. 8, page 18			17,263 66

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures for the Year ended June 30, 1900.

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario.	$ cts.	$ cts.
Belleville......	Floody, E..........	For his portion of seizure No. 4...... ...	11 93	
		" " 5....	24 42	
				36 25
	McAllister A.......	To pay informer penalty in seizure No. 4	....	12 50
Brantford	Spence, John........	" " 43	....	50 00
	Orr, Henry N. . .	For his portion of seizure No. 44..........	.... .	44 00
Guelph.........	Floody, E..........	" " 88.........	....	37 78
Hamilton	"	" " 39.........	... .	1 00
	Irwin, R	" " 37	....	12 50
	Miller, W. F.	" " 37.........	12 50	
		" " 38........ ...	13 97	
		" " 37.........	25 00	
				51 47
		To pay informer penalty in seizure No. 39	....	2 50
	Hesson, C. A.	For his portion of seizure No. 38.........	....	13 97
	Flynn, J. J	" " 38.........	....	13 95
Kingston......	Floody, E..........	" " 83.........	11 00	
		" " 84.........	5 00	
				16 00
	Dickson, C. T.......	To pay informer penalty in seizure No. 83	12 50	
		" " 84	5 00	
				17 50
	Grimason, T........	For his portion of seizure No. 85..	....	25 00
London........	Floody, E....	" " 58.........	8 00	
		" " 63........	5 05	
				13 05
	Alexander, T.	" " 60...	100 00	
		To pay informer penalty in seizure No. 60	130 00	
				230 00
	Webbe, C. E. A	For his portion of seizure No. 62.........	....	1 75
Ottawa........	Costigan, H. A.....	" " G 4,589	25 00	
		" " 100.........	5 23	
		" " 179..... ...	4 25	
		" " 183.........	44 57	
		To pay informer penalty in seizure No. 172	5 00	
		" " 176	5 00	
		" " 177	25 00	
		" " 183	25 00	
		" " 187	25 00	
		" " 191	5 00	
				169 05
	Slattery, R...	For his portion of seizure No. 100.........	5 22	
		" " 150........	29 57	
				34 79
	Casey, John	" " 170.........	....	4 90
	Floody, E	" " 179.... ..	....	4 25
Owen Sound...	Johnston, J. J ...	" " G 4,564... ...	....	25 00
Prescott.......	Floody, E.........	" " 38	24 15	
		" " 39.........	7 15	
				31 30
	Gerald, W. H... ...	" " 40........ .	11 75	
		" " 41.........	12 50	
				24 25
	Keeler, R. M. ..	" " 40.........	11 75	
		" " 41... ...	12 50	
				24 25
	Dumbrille, J... ..	To pay informer penalty in seizure No. 38	25 00	
		" " 40	25 00	
		" " 41	25 00	
				75 00
St. Catharines..	Floody, E....... .	For his portion of seizure No. 25... ...	21 65	
		" " 27...... .	5 00	
				26 65

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures, 1899–1900—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario—Concluded.	$ cts.	$ cts.
Stratford......	Floody, E..........	For his portion of seizure No. 95..	49 00	
Toronto.......	Floody, E	" " G 4,581.......	10 00	
		" " 350.........	0 95	
		" " 351....... .	66 75	
		" " 352.. . ..	39 10	
		" " 354.........	25 00	
		" " 355.........	25 00	
		" " 356........	2 50	
		" " 357...	10 00	
		" " 358........	12 50	
		" " 359.........	10 00	
		" " 363.........	2 50	
		" " 366.........	2 50	
		" " 368	5 00	
				260 80
	Frankland, H. R. ..	" " 358..... ..	25 00	
		" " G 4,585.........	25 00	
				50 00
		To pay informer penalty in seizure No. 353	25 00	
		" penalty collected from J. Gardener No. 355...	25 00	
		To pay informer penalty in seizure No. 356	2 50	
		" " 367	12 50	
		" " 372	5 00	
		" " 374	12 50	
				82 50
	Stratton, W. C. ...	For his portion of seizure No. 351........	....	66 75
	Henderson, W......	" " 353........	23 25	
		" " 367...	6 25	
				29 50
	Boomer, J. B.	" " 358........	12 50	
		" " 366........	2 50	
				15 00
	Falconer, R. H.....	" " 363........	2 50	
		" " G 4,585.......	25 00	
				27 50
	Coulter, A..........	" " 367........	. .. .	6 25
	Dodds, E. W........	" " 368........	... .	5 00
		Quebec.		
Montreal.. ...	Lawlor, H..........	For his portion of seizure No. 983...... ..	4 20	
		" " 988........	32 56	
		" " 989........	30 23	
		" " 991........	1 27	
		" " 1,003........	5 00	
		" " 1,006..	25 70	
		" " 1,025........	25 71	
		" " 1,026........	16 02	
		" " 1,028.	24 75	
		" " 1,034........	27 35	
		" " 1,046.	50 00	
		" " 1,047........	50 00	
				292 79
		To pay informer penalty in seizure No. 958....	50 00	
		To pay informer penalty in seizure No. 990	5 00	
		" " 992	50 00	
		" " 994	25 00	
		" " 995	5 00	
		" " 996	75 00	

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures, 1899–1900—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec.	$ cts.	$ cts.
Montreal—*Con.* .	Cinq-Mars, A.... ..	To pay informer penalty in seizure No. 997	5 00	
		" " 999	5 00	
		" " 1,000	50 00	
		" " 1,004	5 00	
		" " 1,005	25 00	
		" " 1,007	2 50	
		" " 1,008	2 50	
		" " 1,010	50 00	
		" " 1,014	5 00	
		" " 1,016	5 00	
		" " 1,017	50 00	
		" " 1,018	5 00	
		" " 1,021	5 00	
		" " 1,022	2 50	
		" " 1,023	50 00	
		" " 1,024	50 00	
		" " 1,026	50 00	
		" " 1,028	50 00	
		" " 1,029	12 50	
		" " 1,030	50 00	
		" " 1,034	50 00	
		" " 1,035	25 00	
		" " 1,041	5 00	
		" " 1,042	50 00	
		" " 1,043	50 00	
		" " 1,045	50 00	
				920 00
		For his portion of seizure No. 904........	0 50	
		" " 979........	4 13	
		" " 987........	9 38	
		" " 999........	7 60	
		" " G 4,467........	3 46	
		" " 1,010	23 97	
				49 04
	Kearney, D. J......	" " 988........	32 57	
		" " 989........	30 22	
		" " 990..	2 61	
		" " 991........	1 28	
		" " 992....... .	25 42	
		" " 1,005.... ...	27 54	
		" " 1,006........	25 70	
		" " 1,026........	16 02	
		" " 1,028	24 75	
		" " 1,034........	27 35	
		" " 1,116	1 27	
				214 73
	Watkins, J. A	" " 983........	4 21	
		" " 987........	9 38	
		" " 992.... ...	25 42	
		" " 994........	13 55	
		" " 995........	2 61	
		" " 996........	45 86	
		" " 1,000........	24 75	
		" " 1,002........	10 58	
		" " 1,014	6 55	
		" " 1,017	26 37	
		" " 1,018.... ...	0 70	
		" " 1,022........	1 31	
		" " 1,023........	24 12	
				195 41

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures, 1899–1900—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Continued.	$ cts.	$ cts.
Montreal—*Con.*	Courtney, J. J.	For his portion of seizure No. 983		4 21
	Ryan, W.	" " 994	13 55	
		" " 995	2 62	
				16 17
	Floody, E	" " 997		3 06
	Brabant, J. B. G. N	" " 904	0 50	
		" " 979	4 12	
		" " 1,010	23 98	
		" " G 4,467	3 46	
				32 06
	Jones, F. L.	" " 1,004		5 36
	Comte, L. A. A. J.	" " 974	3 97	
		" " 996	45 87	
		" " 1,000	24 75	
		" " 1,017	26 36	
		" " 1,018	0 70	
		" " 1,023	24 13	
				125 78
	Carpenter, L. A	" " 1,020	5 00	
		" " 1,021	2 50	
		" " 1,022	1 31	
				8 81
	O'Grady, D. J.	" " 1,020	5 00	
		" " 1,021	2 50	
				7 50
	Warren, G. S.	" " 1,024	52 20	
		" " 1,025	25 72	
				77 92
	Snowdon, J. W.	" " 1,016		1 28
	Beauchamp, J. P.	" " 1,026		16 01
Quebec	LaRue, G.	To pay informer penalty in seizure No. 404	25 00	
		" 439	50 00	
		" 495	50 00	
		" 496	50 00	
		" 498	50 00	
		" 501	50 00	
		" 505	2 50	
				277 50
	Bourget, O	For his portion of seizure No. 366	0 20	
		" " 404	9 96	
		" " 409	1 10	
		" " 412	0 15	
		" " 475	143 68	
		" " 492	12 55	
				167 64
	Trudel, E.	" " 366	0 20	
		" " 404	9 96	
		" " 412	0 15	
		" " 481	141 70	
		" " 492	12 55	
				164 56
	Lambert, E. A.	" " 465		95 50
	LaRue, A	" " 475		143 67
Sherbrooke	Simpson, A. F.	" " 102	5 46	
		" " 157	21 25	
		" " 184	25 91	
		" " 185	10 40	
		" " 186	23 20	
		" " 187	18 85	
		" " 192	26 84	
		" " 193	18 80	
		" " G 4,426	12 50	

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures, 1899–1900—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Concluded.	$ cts.	$ cts.
Sherbrooke—*Con.*	....	To pay informer penalty in seizure No. 139 collected from C. Benoit....	25 00	
		To pay informer penalty in seizure No. 192	25 00	
		" " 193	25 00	
				238 21
	Brabant, J. B. G. N	For his portion of seizure No. 133	11 92	
		" " 135	11 92	
		" " 136	11 93	
		" " 138	11 93	
		" " 139	12 50	
		" " 140	10 24	
		" " 141	10 24	
				80 68
	Campbell, E	" " G 4,426	....	12 50
	Cinq-Mars, A	For his portion of seizure No. 133	11 93	
		" " 135	11 93	
		" " 136	11 92	
		" " 138	11 92	
		" " 139	12 50	
		" " 140	10 23	
		" " 141	10 23	
				80 66
Sorel	Fortier, J. J. O	" " 75	23 95	
		To pay informer penalty in seizure No. 75	50 00	
				73 95
	Cinq-Mars, A	For his portion of seizure No. 75	....	23 95
Three Rivers	Simpson, A. F	" " 104	8 50	
		" " 107	1 80	
				10 30
		New Brunswick.		
St. John	Atherton, R	For his portion of seizure No. 98	....	2 50
	Kelly, J. T	" " 99	1 25	
		To pay informer penalty in seizure No. 99	2 50	
				3 75
	Floody, E	For his portion of seizure No. 98	2 50	
		" " 99	1 25	
				3 75
		Nova Scotia.		
Halifax	Grant, H. H	To pay informer penalty in seizure No. 175	25 00	
		" " 177	25 00	
		" " 178	5 00	
		" " 179	25 00	
		" " 180	5 00	
		" pen. collected from J. P. May	50 00	
				135 00
	Floody, E	For his portion of seizure No. 172	32 52	
		" " 175	19 85	
				52 37
	Blethen, C. W.	" " 177	25 00	
		" " 178	5 00	
		" " 179	21 75	
		" " 180	5 00	
				56 75
	Jones, T. L.	" " 172	....	32 53
Pictou	Kelley, J. F	" " 63	....	5 00
	Chisholm, D	" " 75	....	45 57
	O'Brien, James	" " 75	....	45 58
	Murray, D	" " 78	....	73 98
	Fraser, P	" " 78	....	73 98

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1899–1900—*Concluded.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Manitoba.	$ cts.	$ cts.
Winnipeg	Barrett, J. K.	For his portion of seizure No. 58	68 95	
		" " 59	5 50	
		" " 60	11 00	
				85 45
	Sutherland, H. M.	" " 59		5 50
	Watson, W. W.	" " 61		3 75
		British Columbia.		
Vancouver	Stuart, A. K.	For his portion of seizure No. 11	1 90	
		" " 12	70 25	
				72 15
	Miller, J. E.	" " 14	39 25	
		To pay informer penalty in seizure No. 19	40 00	
				79 25
Victoria	Henwood, G.	His portion of seizure No. 26		12 50
		Grand total		5,733 17

RECAPITULATION.

Ontario	$ 1,542 06
Quebec	3,339 25
New Brunswick	10 00
Nova Scotia	520 76
Manitoba	94 70
British Columbia	163 90
Total	$ 5,670 67

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX B—*Continued.*

No. 5.—Details of Sundry Minor Expenditures for the Fiscal Year ended June 30, 1900.

To whom paid.	Services.	Deductions for Superannuation.	Amounts paid.	Totals.
	Minor Revenues.		$ cts.	$ cts.
Cowper, Thos. D ...	Professional services in *re* Regina *vs.* Baxter and Bridgeburg Ferry Co		10 00	
Dudley, W. H........	Expenses *re* investigation of Fort Erie and Buffalo Ferry..........		5 00	
			15 00	
	Add—Printing.....		12 50	
	Total		....	27 50
	Inspection of Staples.			
Bell, Chas. N., Secretary Board of Trade, Winnipeg	Expenses of Board meetings to determine standards of grain ....$3,314 23 Less—Grain sold...... .... 174 65		3,139 58	
Wills, E. A., Secretary Board of Trade, Toronto...............	Expenses of Board meetings to determine standards of grain..................		641 42	
Hadrill, George, Secretary Board of Trade, Montreal............	" " " ..		546 18	
Horn, David	" " " ..		1,200 00	
McNeill, W. J........	Expenses to Almonte to secure samples of grain . . .		10 20	
Roy, Georges........ ..	Salary as Chief Inspector of Hides for year.... ...		1,500 00	
"	Travelling and other expenses in connection with Raw Hides Inspection		121 94	
The *Journal*..	Advertising for Hide Inspector		4 50	
The *Free Press*	" "		3 75	
The Ottawa *Citizen* . .	" "		9 00	
			7,176 57	
	Add—Printing		14 30	
			7,190 87	
	Less—Balance due to Hide Inspector July 1, 1900		21 94	
	Total		....	7,168 93
	Adulteration of Food.			
Macfarlane, Thomas ...	Salary as Chief Analyst for the year..	60 00	2,940 00	
McGill, A.............	" 1st Assistant Analyst for the year.	37 96	1,862 04	
Tourchot, A. L. J	" 2nd " " ..	....	1,249 98	
Watson, James	" Clerk in laboratory " ..	....	949 92	
Tyrrell, M. J..	" " " ..	.. . . ..	599 97	
Levêque, H..	" Messenger in laboratory " ..	....	399 96	
Watson, James	" Food Inspector " ..	....	200 00	
Kidd, Thomas.........	" " " ..	. . . ..	500 00	
Costigan, J. J	" " " ..	5 00	245 00	
Ferguson, J. C	" " " ..	3 00	147 00	
Waugh, Richard J	" " " ..	....	300 00	
Saucier, X	" " " ..	4 00	196 00	
Fletcher, R. W........	" Food Inspector from March 2 to June 30, 1900	....	66 10	
		109 96	....	9,655 97

APPENDIX B—*Continued.*

No. 5.—Details of Sundry Minor Expenditures, 1899-1900—*Continued.*

To whom paid.	Services.	Amounts paid.	Totals.
	Adulteration of Food—*Continued.*	$ cts.	$ cts.
	Contingencies.		
Macfarlane, Thomas	Travelling and other expenses	568 45	
Watson, James	" "	684 03	
Kidd, Thomas	" "	445 76	
Costigan, J. J	" "	372 51	
Ferguson, J. C.	" "	121 20	
Waugh, R. J	" "	111 20	
Saucier, X	" "	136 95	
Parkinson, C. B	" "	74 17	
			2,514 27
Fiset, M	Allowance under Act for retaining fees	200 00	
	" " materials used in analysis	100 00	
	Fees for analysis	1,072 10	
		1,372 10	
	Less—Paid The Robert Mitchell Co. for repairing copper flasks	11 50	
			1,360 60
Ellis, W. H.	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " materials used in analysis	100 00	
	Fees for analysis	880 00	
			1,280 00
Harrison, F. T	Allowance under Act for retaining fees	200 00	
	" " materials used in analysis	100 00	
	Fees for analysis	1,052 00	
			1,352 00
Bowman, M.	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " materials used in analysis	100 00	
	Fees for analysis	693 80	
			1,093 80
Valade, F. X	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " materials used in analysis	100 00	
	Fees for analysis	885 00	
			1,285 00
Fagan, C. J	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " materials used in analysis	100 00	
	Fees for analysis	525 50	
			925 50
Kenrick, E. B	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " materials used in analysis	100 00	
	Fees for analysis	1,007 25	
			1,407 25
Edwards, J. B.	Allowance under the Act for retaining fees	100 00	
	" " rent	50 00	
	" " materials used in analysis	50 00	
	Fees for analysis	528 00	
		728 00	
	Less—Paid Montreal Gas Co. for gas supply in laboratory	11 70	
			716 30
Rosa Baker Edwards for estate of the late J. B. Edwards	Allowance under the Act for retaining fees	50 00	
	" " rent	25 00	
	" " materials used in analysis	25 00	
	Fees for analysis	88 00	
	Travelling expenses	11 10	
			199 10

APPENDIX B—*Continued.*

No. 5.—Details of Sundry Minor Expenditures, 1899–1900—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	Adulteration of Food—*Concluded.*	$ cts.	$ cts.
	Contingencies—Concluded.		
Potvin, Napoléon......	Freight and express charges....	177 27	
Whitehead, Mrs. J.....	Services cleaning instruments, sample bottles, &c., for the year........	156 50	
Wright, Miss S. E.....	Services in laboratory, Ottawa, for the year.........	500 00	
Eimer & Amend.......	Chemical apparatus and materials for laboratory ...	383 72	
Montreal Gas Co.... ..	Gas supplied to Dr. J. B. Edwards, Montreal (deducted from his expenses above).......	11 70	
Skinner, J. & Co... ...	Chemicals, &c., supplied to laboratory.......... ...	243 57	
Dominion Express Co..	Express charges......	15 60	
Butterworth & Co......	Materials supplied an work performed for laboratory	31 35	
Parr, J.	Lumber for laboratory.....	29 00	
Gooderham & Worts...	Spirits for laboratory..............	31 99	
The Robert Mitchell Co	Work done for . Fiset	11 50	
Lyman Sons & Co	Chemicals supplied to laboratory.........	1 78	
Bryson, Graham & Co..	Goods supplied to laboratory.....	21 60	
Connor, M. F....... ..	Services for laboratory.	40 00	
Murphy, J. J....	Repairing apparatus for laboratory.................	15 40	
Graves Bros..........	Goods supplied to laboratory ..:	8 25	
Christie & Co , C. T....	Materials supplied to laboratory............... ...	2 85	
Girdwood, Dr. G. P....	Attending meeting of Board of Examination of candidates for public analysts	35 35	
Gauvreau, Rev. G......	" " " " ..	25 50	
Rosa Baker Edwards...	Instrument for laboratory	50 00	
Warburton & McKinnon	Law costs in *re* Regina *vs.* Rottenbury	4 75	
			1,797 68
	Total adulteration of food expenditure.........	....	23,587 47
	Less—Sale of apparatus also analysts' supplies to sundry persons....................	....	31 40
	Grand total.	. ...	23,556 07
	Add—Printing.............................. ...	593 62	
	Stationery.......	117 45	
			711 07
	Authorized disbursements (less superannuation).....	....	24,267 14
	Add—Balances due by food inspectors July 1, 1900	....	225 81
	Less—Balances due by food inspectors June 30, 1900	....	24,492 95 25 81
			24,467 14
	Actual disbursements on account of minor expenditures agreeing with statement No 12, page 21....	....	31,663 57

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B.—*Continued.*

No. 6.—Details of Departmental Expenditures for the Year ended June 30, 1900.

Names.	Rank.	Period.	Deductions for Superannuation.	Amounts Paid.	Totals.
			$ cts.	$ cts.	$ cts.
Sir Henri G. Joly de Lotbinière......	Minister	From July 1, '99, to June 22, '00, noon.	....	6,834 71	
Hon. M. E. Bernier	"	From June 22, noon, to June 30, '00 .. .	....	165 29	
Miall, E....	Commissioner	For the year..	64 00	3,136 00	
Gerald, W. J ...	Assistant Commissioner and Chief Inspector............	" ..	60 00	2,940 00	
Himsworth, W	Chief Clerk and Secretary.........	" ..	48 00	2,352 00	
Campeau, F. R. E..	Chief Clerk and Chief Accountant.	" ..	44 00	2,156 00	
Hall, C. R.......	Assistant Accountant............	" ..	36 00	1,764 00	
Valin, J. E.......	Accountant's Branch Clerk..	" ..	36 00	1,764 00	
Carter, Wm........	Assistant Secretary...	" ..	36 00	1,764 00	
Shaw, J. F.... ...	Chief Statistical Clerk, Accountant's Branch........	" ..	31 00	1,519 00	
Doyon, J. A.	Weights and Measures Clerk, Accountant's Branch.	" ..	29 00	1,421 00	
Westman, Thomas.	Statistical Clerk, Accountant's Branch............	" ..	28 00	1,372 00	
Blatch, F. K	Clerk of Supplies, Secretary's Branch........................	" .	28 00	1,372 00	
Newby, F.........	Secretary's Branch Clerk..........	" ..	28 00	1,372 00	
Byrnes, Jno.. ..	Accountant's Branch Clerk	" ..	28 00	1,372 00	
Quain, R..........	" "	" ..	28 00	1,372 00	
Fowler, G	Stamp Clerk, Secretary's Branch...	" ..	28 00	1,372 00	
Dunne, J. P......	Accountant's Branch Clerk........	" ..	28 00	1,372 00	
Burns, John.. .	Weights and Measures Clerk, Accountant's Branch...	" ..	28 00	1,372 00	
Winter, C. F	Second Class Clerk	" ..	24 00	1,176 00	
Lebel, J. A. W . .	Secretary's Branch Clerk...........	" ..	38 50	1,061 50	
Hughes, P. A ...	Accountant's Branch Clerk........	" ..	38 50	1,061 50	
Hudon, L. E. ..	Statistical Clerk, Accountant's Branch	" ..	38 50	1,061 50	
McCullough, A ..	Secretary's Branch Clerk..... ...	" ..	14 60	715 40	
Bouchette, R. Errol	Private Secretary.................	" ..	....	600 00	
Halliday, W. A...	Accountant's Branch Clerk.......	" ..	21 00	579 00	
Potvin, Napoléon..	Messenger................. ...	" ..	14 70	475 30	
Yetts, R. P..	"	" ..	11 70	378 30	
	Total Salaries	....	809 50	....	43,900 50

APPENDIX B—*Continued.*

No. 6 —Details of Departmental Expenditures, 1899–1900—*Continued.*

Names.	Service.	Amounts Paid.	Totals.
	Contingencies.	$ cts.	$ cts.
Hagerty, Miss B.	Extra clerk for the year.	465 44	
Lawless, Miss E.M.	" "	445 00	
Robillard, G. A.	" "	463 37	
Sullivan, Miss M.	Clerical assistance from Aug. 17, to Dec. 31, 1899.	149 97	
Chateauvert, G. E.	Clericel assistance from Oct. 3, 1899, to June 30, 1899.	308 01	
Postmaster	Postage	30 74	
The Bell Telephone Co.	Telephone messages	44 65	
C. P. R. Telegraph Co.	Telegraph account	181 39	
G. N. W. Telegraph Co	"	143 06	
Cont. of Stationery.	Stationery	1,150 19	
" "	Books	211 43	
" "	Parliamentary publications	103 75	
Queen's Printer	Printing	678 34	
"	Lithographing	7 50	
Dominion Express Co	Freight	38 60	
Bryson, Graham & Co	Towels and sundries for department	23 81	
Aubé, Jos.	Drafting and mounting map of Dominion Revenue Stamps	30 00	
Bailey, G.	Repairing letter press	19 00	
Lemaître, G	Packing	5 51	
Canadian Express Co	Freight	10 41	
Vézina, T.	1 curtain	4 52	
Graves Bros	1 galvanized pan	2 00	
Jones, Yarnell & Poutter, London, Eng., for Chemical News and Electrician	Subscription	15 70	
Journal of Commerce, Montreal	"	4 00	
Banner Printing Co., Chatham	"	4 65	
Manitoba Free Press	"	9 35	
Daily World, Vancouver	"	5 00	
L'Evangeline, Weymouth	"	1 25	
Le Cultivateur, Montreal	"	2 00	
The Star, Battleford	"	1 25	
The Paper Trade Journal, New York	"	0 50	
Bulletin des Recherches Historiques, Lévis	"	2 00	
The Scientific American and Supplement, New York	"	6 00	
Daily Star, New York	"	7 00	
Electrical World and Engineer, New York	"	3 10	
La Presse, Montreal	"	6 00	
The Catholic Record, London	"	2 00	
W. Wild Co., London	"	2 00	
Toronto Saturday Night	"	6 00	
La Patrie, Montreal	"	9 00	
The Tribune, Winnipeg	"	4 00	
The Canadian Gazette, London, Eng	"	4 38	
The Gazette, Montreal	"	18 00	
Le Temps, Ottawa	"	3 00	
Daily Witness, Montreal	"	12 00	
Commercial Financial Chronicle, New York	"	10 00	
Canadian Mining Review	"	6 00	
Mail and Empire, Toronto	"	8 00	
The Herald, Montreal	"	12 00	
The Evening Journal, Ottawa	"	12 00	
Le Prix Courant, Montreal	"	4 50	
Le Progrès, Windsor	"	1 50	
The Brampton Times	"	1 50	
The Belleville Sun	"	5 00	

APPENDIX B—*Concluded.*

No. 6.—Details of Departmental Expenditures, 1899-1900—*Concluded.*

Names.	Service.	Amounts Paid.	Totals.
	Contingencies—Concluded.	$ cts.	$ cts.
The Daily Free Press, Ottawa	Subscription	12 00	
The Catholic Register, Toronto	"	1 83	
Le Progrès de Louiseville	"	2 50	
The Globe, Toronto	"	12 00	
The Toronto World	"	3 00	
The Shareholder	"	2 00	
Le Canada Français, St. John, N.B	"	2 00	
The Journal, St. Catharines	"	6 00	
The Montreal Daily Star	"	9 00	
The Daily Telegraph, Quebec	"	12 00	
Le Soleil, Quebec	"	3 00	
The Ottawa Citizen	"	24 00	
The New Capital Ice Co	Supplying ice	6 00	
Payment, T.	Soap and sundries	18 30	
Maveity, Mrs. S	Washing towels	60 00	
Batterton, T.	Packing	27 77	
Storr, A. M	Cartage	83 50	
Dupont, J. C	Sundries for department	5 95	
Marion, Mrs. Mary	Washing towels	3 00	
Potvin, Napoléon	Sundry petty expenses	17 26	
	Total, Departmental Contingencies		5,016 48
	Authorized disbursements (less superannuation)		48,916 98
	Add—Balance due June 30, 1900		16 66
			48,933 64
	Less—Balance due July 1, 1899		16 66
	Actual disbursements agreeing with Statement No. 17, page 41		48,916 98

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 7.—Details of Weights and Measures Expenditures for the Year ended June 30, 1900.

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Johnson, W.	Salary as Inspector for year	....	24 00	3 00	1,173 00	
Slattery, T.	" Mechanical Inspector for year	....	13 96	1 80	684 24	
Irwin, S.	" Asst. Inspector for year	....	13 96	1 80	684 24	
Behan, J. J.	" " "	....	....	1 50	598 50	
Errett, R. W.	" " "	....	....	1 27	198 65	
	Salaries	....	51 92	9 37	3,338 63	
	Contingencies	....	....	....	2,125 10	
						5,463 73
	Hamilton.					
Freed, A. T.	Salary as Inspector for year	....	....	3 60	1,596 35	
McDonald, J.	" Asst. Inspector for year	....	16 04	1 80	782 16	
Marentette, A.	" " "	..	16 04	1 80	782 16	
Fitzgerald, E. W.	" " "	....	....	1 80	748 20	
Laidman, R. H.	" " " from July 1 to Sept. 7, and from Dec. 8 to June 30	....	....	1 80	523 60	
Wheatley, A. E.	" Asst. Inspector for year	....	....	1 80	648 12	
Jarvis, H.	" " "	....	....	1 80	594 70	
	Salaries	....	32 08	14 40	5,675 29	
	Contingencies	....	....	....	1,071 05	
						6,746 34
	Ottawa.					
Macdonald, J. A.	Salary as Inspector for year	....	....	2 70	1,297 26	
Breen, J.	" Asst. Inspector for year	....	....	1 80	598 20	
McFarlane, J.	" " "	...	7 04	1 80	551 16	
Winsor, J. A.	" " "	...	....	1 80	598 20	
Elliott, T. H.	" " "	Insurance. 41 76	....	1 80	556 44	
	Insurance	41 76	....	....	....	
	Salaries	....	7 04	9 90	3,601 26	
	Contingencies	..	....	....	1,394 00	
						4,995 26
	Toronto.					
Piper, H.	Salary as Inspector, from July 1 to Dec. 31	....	12 96	1 80	635 22	
Kelly, D.	" Inspector, from Jan. 1 to June 30	...	....	1 80	648 18	
Milligan, R. J.	" Asst. Inspector for year	....	....	1 80	748 20	
Wright, R.	" " "	....	15 00	1 05	733 95	
Smith, J. C.	" " "	....	....	1 80	598 20	
Murdoch, J.	" " "	....	....	1 80	648 18	
	Salaries	....	27 96	10 05	3,961 93	
	Contingencies	....	....	....	1,624 48	
						5,586 41
	Windsor.					
Hayward, W. J.	Salary as Inspector for year	....	24 00	3 00	1,173 00	
Coughlin, D.	" Mech'l Inspector for year	....	....	1 80	798 12	
Thomas, J. S.	" Asst. Inspector for year	....	....	1 80	798 12	
Hughes, R. A.	" " "	....	....	1 80	648 12	
	Salaries	....	24 00	8 40	3,417 36	
	Contingencies	....	....	....	1,084 66	
						4,502 02

APPENDIX B—*Continued.*

No. 7.—Details of Weights and Measures Expenditures, 1899–1900—*Con.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Montreal.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Chalus, J. O.	Salary as Inspector for year	...	31 96	3 60	1,564 44	
Daoust, J. A.	" Asst. Inspector for year	...	16 04	1 80	782 16	
Gervais, S.	" " "	....	16 04	1 80	782 16	
Hébert, J. A. P.	" " "	....	....	1 80	798 82	
Langlois, J. H.	" " " from July 1 to Oct. 31	.....	....	0 75	266 04	
Baker, J. S	" Asst. Inspector for year	......	......	1 80	698 16	
Dessert, V.	" " "	.....	....	1 80	598 20	
Tomlinson, W.M.	" " "	....	....	1 80	598 20	
Fournier, L. A.	" " "	......	......	1 80	498 12	
Collins, D.	" Mechanical Inspector from Dec. 13 to June 30	.....	....	0 90	439 91	
Boudet, E.	" Asst. Inspector from Feb. 1 to June 30	.....	....	0 75	332 55	
	Salaries	.....	64 04	18 60	7,358 06	
	Contingencies	......	....	....	1,926 34	
						9,284 40
	Quebec.					
Guay, G. N.	Salary as Inspector for year	..	....	3 60	1,129 71	
		Insurance				
Kelly, M. J.	" Asst. Inspector for year	38 28	23 96	1 80	735 96	
Pinhey, H.	" Mech'l " "	...	....	1 80	598 20	
Chabot, F. X.	" Asst. " "	......	12 00	1 80	586 20	
Guay, A.	" " " "	......	......	1 80	698 16	
Petit, J. B.	" " " "	......	6 32	1 80	491 88	
Moreau, A.	" Caretaker for year	.....	6 00	....	294 00	
	Insurance	38 28	....	....	... .	
	Salaries	......	48 28	12 60	4,534 11	
	Contingencies	......	....	....	1,500 72	
						6,034 83
	Three Rivers.					
Gravel, A. I.	Salary as Inspector for year	......	... .	3 60	996 36	
Provost, J. J.	" Asst. Inspector for year	34 96	....	1 80	663 24	
	Salaries	34 96	....	5 40	1,659 60	
	Contingencies	.....	....	....	680 95	
						2,340 55
	St. John.					
Wilmot, J. B.	Salary as Inspector for year	....	24 00	3 60	1,172 40	
Cowan, E.	" Asst. Inspector for year	.....	13 96	1 80	684 24	
Richard, D.	" " "	...	12 00	1 80	586 20	
	Salaries	.....	49 96	7 20	2,442 84	
	Contingencies	......	....	....	484 99	
						2,927 83
	Cape Breton.					
Lawrence, Geo. C.	Salary as Inspector for year	......	....	3 60	796 40	
	" Contingencies	.....	.....	....	333 74	
						1,130 14

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APPENDIX B—*Continued.*

No. 7.—Details of Weights and Measures Expenditures, 1899–1900—*Con.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Halifax.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Frame, A.......	Salary as Inspector for year...	.....	....	3 60	996 36	
Waugh, R. J	" Asst. Inspector for year....	......	....	1 80	598 20	
	Salaries........	...	....	5 40	1,594 56	
	Contingencies......	. ..	....	....	561 50	
						2,156 06
	Pictou.					
Dustan, W. M...	Salary as Inspector for year.........	.....	19 96	3 60	976 44	
Chisholm, J. J...	" Asst. Inspector for year....	...	.....	1 80	598 20	
	Salaries	.....	19 96	5 40	1,574 64	
	Contingencies......	......	....	....	336 21	
						1,910 85
	Charlottetown.					
Davy, E	Salary as Inspector for year.... ...	......	....	5 10	894 90	
Hughes, H	" Asst. Inspector for year....	......	....	1 80	598 20	
	Salaries	...	....	6 90	1,493 10	
	Contingencies	...	....	....	226 79	
						1,719 89
	Winnipeg.					
Magness, R.. ...	Salary as Inspector for year	......	....	3 60	1,396 32	
McDonald, A. W.	" Asst. Inspector for year....	.....	....	1 80	598 20	
Francis, G. M ...	" " "	.....	....	1 80	542 49	
Girdlestone, R J M	" " "	.. ...	4 04	1 80	194 16	
Ross, H. E.......	" " "	.... .	....	1 80	98 16	
	Salaries..........	.... .	4 04	10 80	2,829 33	
	Contingencies	....	.. ....	....	2,340 49	
						5,169 82
	Calgary.					
Thomas, P.	Salary as Inspector for year	......	....	3 60	196 32	
Costello, J. W...	" Asst. Inspector for year....	.....	13 96	1 80	684 24	
	Salaries.....................	......	13 96	5 40	880 56	
	Contingencies....	. ...	....	....	176 96	
						1,057 52
	Victoria					
Findley, H	Salary as Inspector for year	......	....	3 60	796 32	
McAloney, J. A..	" Asst. Inspector for year....	......	....	1 80	348 12	
	Salaries	.. ...	....	5 40	1,144 44	
	Contingencies	......	....	....	1,134 30	
						2,278 74
	General.					
Miall, E.........	Salary as Commissioner of Standards for the year	......	16 00	....	....	784 00
Higman, O	Contingencies	......	....	....	....	16 27

APPENDIX B—*Continued.*

No. 7.—Details of Weights and Measures Expenditures, 1899-1900—*Con.*

To whom paid.	Service.	Amounts paid.	Total amounts paid.
	General Contingencies.	$ cts.	$ cts.
Burgess, Thos. H.	Services as mechanical assistant from June 1, 1899, to June 30, 1900	866 74	
Potvin, Napoléon	Express and freight charges	93 66	
Bernard, F. X.	Services from June 16, 1899, to June 1, 1900, 349 days at $400 per annum	390 71	
Pritchard-Andrews Co.	Model dater, steel punches, lead seals, copper brands, sets of numerals	264 95	
Canadian Pacific Ry	Freight on box of scales to Vancouver	16 04	
Havez, Vve. L.	Balance due on 25 sets metric system, 46 metric compendiums, tables of metric system, &c	492 42	
Free Press	100 copies "Notes on Metric System"	3 00	
Fleck, Alex., jun.	200 tested 50 lb. weights	310 00	
American Bank Note Co.	To pay for stamps and labels supplied	330 00	
Butterworth & Co.	Padlocks, tin boxes	20 00	
			2,787 52
	Law Costs.		
Fyfe, James	Professional services, consultation with Mr. Higman		10 00
Fontaine, R. E.	Law costs *in re* L. A. Fournier *vs.* L. Chouinard		10 20
Gouin, Lomer	" Regina *vs.* Lorrain		30 60
Mathers, T. G.	Professional services *in re* Regina *vs.* Hicks		12 50
Fraser, A. W.	Law costs *in re* Regina *vs* Burton		10 00
Clute & Williams	" Regina *vs.* Haslip		18 00
	Total general contingencies		2,878 82
	Grand total		66,983 48
	Add—Printing	520 19	
	Stationery	280 82	
	Lithographing	7 00	
			808 01
	Authorized disbursements (less superannuation)		67,791 49
	Add—Balances due to Inspectors July 1, 1899	538 70	
	" by Inspectors June 30, 1900	160 00	
	Old " " "	193 26	
			891 96
			68,683 45
	Less—Balances due to Inspectors June 30, 1900	395 70	
	Old balances due by Inspectors June 30, 1900	193 26	
			588 96
	Actual disbursements agreeing with Statement No. 20, page 46		68,094 49

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures for the year ended June 30, 1900.

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total Amounts paid.
	Barrie.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Shanacy, M.	Salary as Inspector for year	......	2 00	3 60	94 40	
	Contingencies	......	....	....	1 25	95 65
	Belleville.					
Johnson, Wm.	Salary as Inspector for year	.....	4 96	3 00	242 04	
McRae, W. D.	" Assistant Inspector for year	...	....	1 80	98 16	
	Salaries	.....	4 96	4 80	340 20	
	Contingencies	......	....	....	235 43	575 63
	Berlin.					
Lynes, K.	Salary as Inspector from July 1 to Aug. 31	......	0 32	0 60	15 74	
	Contingencies	......	....	....	43 59	59 33
	Brockville.					
Johnson, C. W.	Contingencies	......	....	....	....	109 71
	Cobourg.					
Bickle, J. W.	Salary as Inspector for year	...	2 00	3 60	94 40	
	Contingencies	......	....	....	41 30	135 70
	Cornwall.					
Mulhern, M. M.	Salary as Inspector for year	...	2 00	3 60	94 40	
	Contingencies	......	....	....	44 40	138 80
	Guelph.					
Broadfoot, S.	Salary as Inspector for year	...	2 00	3 60	94 40	
	Contingencies	....	....	....	12 38	106 78
	Hamilton.					
McPhie, D.	Salary as Inspector for year	......	36 00	3 60	1,760 40	
Dennis, W. A.	" Assistant Inspector for year	......	......	1 80	98 16	
	Salaries	......	36 00	5 40	1,858 56	
	Contingencies	......	....	....	259 45	2,118 01
	Kingston.					
Behan, J. J.	Salary as Inspector for year	.....	....	3 00	397 00	
	Contingencies	.....	....	....	146 22	543 22
	Listowel.					
Male, Thos.	Salary as Inspector for year	.....	....	3 60	96 40	
	Contingencies	......	....	....	72 00	168 40

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures, 1899–1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total Amounts paid.
	London.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Nash, A. F.	Salary as Inspector from Dec. 12 to June 30	....	....	1 80	551 94	
Hayward, W. J.	" Acting Inspector from June 25 to Dec. 11	....	....	....	250 00	
	Salaries	......	....	1 80	801 94	
	Contingencies	....	....	....	702 67	
						1,504 61
	Napanee.					
Johnson, W. (acting)	Contingencies	...	....	....	....	22 15
	Ottawa.					
Roche, H. G.	Salary as Inspector for year	......	....	3 60	996 40	
	Contingencies	....	....	....	907 08	
						1,903 48
	Owen Sound.					
Graham, W. J.	Salary as Inspector for year	....	4 00	3 60	192 40	
	Contingencies	.....	....	....	125 50	
						317 90
	Peterborough.					
Cahill, T.	Salary as Inspector from July 1 to May 31	......	3 63	3 30	176 33	
	Contingencies	....	....	....	4 25	
						180 58
	Sarnia.					
Hicks, W. H.	Contingencies	.....	....	....	......	21 60
	Stratford.					
Rennie, G.	Salary as Inspector for year	.....	4 00	3 60	192 40	
	Contingencies	.....	....	....	14 95	
						207 35
	Toronto.					
Johnstone, J. K.	Salary as Inspector for year	....	31 97	3 60	1,564 43	
Pape, Jas.	" Assistant Inspector for year	....	......	1 80	798 12	
	Salaries	.....	31 97	5 40	2,362 55	
	Contingencies	.....	....	....	58 15	
						2,420 70
	Montreal.					
Aubin, A.	Salary as Inspector for year	....	....	3 60	1,396 32	
O'Flaherty, M. J.	" Assistant Inspector for year	......	....	1 80	798 12	
	Salaries	.....	....	5 40	2,194 44	
	Contingencies	...	....	......	749 68	
						2,944 12
	Quebec.					
Le Vasseur, N.	Salary as Inspector for year	.....	19 96	3 60	976 44	
Moreau, J. A.	" Caretaker	......	6 00	....	294 00	
	Salaries	..	25 96	3 60	1,270 44	
	Contingencies	......	....	....	199 35	
						1,469 79

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures, 1899–1900—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Sherbrooke.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Simpson, A. F...	Salary as Inspector for year..... ...	..	2 00	2 70	....	95 30
	Fredericton.					
Fowler, J. D	Salary as Inspector for year.........	......	.. ....	3 60	....	196 40
	St. John.					
Rowan, A	Salary as Inspector from July 1 to Jan. 31.................	......	11 62	2 10	569 59	
Wilson, J. E.....	" Inspector from April 26 to June 30....	...	....	0 60	179 94	
	Salaries......	.....	11 62	2 70	749 53	
	Contingencies..	......	... .	....	71 21	820 74
	Halifax.					
Miller, A.........	Salary as Inspector for year.........	.. .	24 00	1 80	1,174 20	
Munro, H. D....	" Assistant Inspector for year	. . .	1 96	1 80	96 24	
Ritchie, A. J	" " from May 7 to June 30	.....	....	0 15	75 75	
	Salaries............	.....	25 96	3 75	1,346 19	
	Contingencies............ .	.....	.. ..	....	755 73	2,101 92
	Charlottetown.					
Brace, R. K.....	Salary as Inspector from July 1 to Jan. 31.................	...	....	2 10	114 52	
	Contingencies..............	....	....	....	36 71	151 23
	Winnipeg.					
Magness, R . ..	Salary as Inspector for year	......	... .	3 60	196 40	
	Contingencies.........	.....	....	....	150 02	346 42
	Nanaimo.					
McAloney, J ...	Salary as Inspector for year	......	....	3 60	. ...	96 40
	New Westminster.					
Wolfenden, W...	Salary as Inspector for year	5 00	....	3 60	....	91 40
	Vancouver.					
Miller, J. E......	Salary as Inspector for year....	.....	6 00	3 60	290 40	
	Contingencies..	......	....	....	59 60	350 00
	Victoria.					
Jones, R	Salary as Inspector for year.........	. ...	4 00	3 60	192 40	
	Contingencies........ ...	.....	....	. ...	13 80	206 20
	General.					
McPhie, D	Contingencies.................	.....	....	... .	....	1,235 38

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures, 1899–1900—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
American Bank Note Co	To stamps and labels supplied	900 85	
Canadian Rubber Co	Rubber tubing	44 75	
Pritchard-Andrews Co	Brass and steel meter seals, daters, &c	142 85	
Macfarlane, Thos	Expenses incurred in carrying out the work of gas analysis	93 48	
			1,181 93
	Law Costs.		
Chrysler & Bethune	Law costs in *re* Regina *vs.* Buckley	....	7 50
	Total general contingencies	....	1,189 43
	Grand total	....	21,924 33
	Add—Printing	394 80	
	Stationery	115 22	
	Lithographing	85 00	
			595 02
	Authorized disbursements (less superannuation)	....	22,519 35
	Add—Balances due by inspectors, June 30, 1900	244 56	
	" " July 1, 1899	201 62	
			446 18
			22,965 53
	Less—Balances due by inspectors, July 1, 1899	212 88	
	" " June 30, 1900	314 86	
			527 74
	Actual disbursements agreeing with Statement No. 22, page 52	....	22,437 79

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 9.—Details of Electric Light Inspection, Expenditures for the year ended June 30, 1900.

To whom paid.	Service.	Amounts. Paid.	Totals.
	Belleville.	$ cts.	$ cts.
Johnson, Wm.	Contingencies		134 90
	Hamilton.		
McPhie, D.	Contingencies		40 20
	London.		
Williams, J.	Contingencies		46 45
	Toronto.		
Johnstone, J. K.	Contingencies		146 40
	Montreal.		
Aubin, A.	Contingencies		402 73
	Quebec.		
LeVasseur, N.	Contingencies		19 56
	Sherbrooke.		
Simpson, A. F	Contingencies		93 30
	St. John.		
Rowan, A	Contingencies		73 30
	Halifax.		
Miller, A.	Contingencies		130 75
	Winnipeg.		
Magness, R.	Contingencies		25 95
	Vancouver.		
Miller, J. E	Contingencies		63 00
	Victoria.		
Jones, R.	Contingencies		80 00
	Chief Electrical Engineer.		
Higman, O.	Salary for year	2,347 39	
	Contingencies	471 36	
			2,818 65

APPENDIX B—*Continued.*

No. 9.—Details of Electric Light Inspection Expenditures—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Potvin, Napoléon	Express and freight charges	27 35	
Ottawa Electric Co.	1 switch, 6 months current for electrical laboratory	65 50	
Higman, O., jr.	Services from July 1 to 31, 1899, Aug. 1 to Sept. 10, 1899, 72 days, at $75 per month	175 00	
Weston Electrical Instrument Co.	1 multiplier and repairs, 1 voltmeter and repairs	59 17	
Parr, J. A.	Lumber	51 36	
Shedrick, C. E.	Repairs to voltmeter and ammeter and Watt meter	55 50	
Ahearn & Soper	2 Weston voltmeters	182 30	
Topley, Wm. J.	Plates for X ray camera, lantern slides	16 65	
American Meter Co.	3 burner test meters	75 25	
Edison Decorative and Miniature Lamp Dept.	1 X ray tube	13 80	
Eimer & Amend	3 vacuum tubes	13 85	
Hope, James	8½ days' carpenter work	17 00	
Pritchard-Andrews Co.	Recutting 5 meter seals	23 00	
Siemens Bros. & Co.	Electrical supplies	66 15	
			841 88
	Law Costs.		
O'Reilly, J. R.	Law costs in *re* Regina *vs.* Bowen *et al*		5 00
Colter & Goodman	" Regina *vs.* S. N. Burns	6 60	
	" Regina *vs.* R. D. Thompson	6 60	
			13 20
Leduc, J. D.	" Regina *vs.* St. Jérôme Electric Co.		99 33
	Total general contingencies		959 41
	Grand total		4,955 40
	Add—Printing	58 36	
	Stationery	12 57	
			70 93
			5,026 33
	Less—Balances due to inspectors June 30, 1899		348 60
	Actual disbursements agreeing with Statement No. 24, page 55		4,677 73

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department on Salary, during the Year ended June 30, 1900.

Names.	Services. Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Adams, J. S		1							
Alexander, Thos		1							
Allen, G. A.		1							
Alteman, Peter J		1							
Amor, Wm		1							
Andrews, A. A		1							
Armstrong, Walter		1							
Atherton, R		1							
Aubin, A					1	1			
Baby, Jos		1							
Baby, W. A. D		1							
Baker, J. S				1					
Barber, J. S		1							
Barnes, G		1							
Barrett, J. K		1							
Basinet, Louis		1							
Bayard, Gilbert A		1							
Beauchamp, J. P		1							
Beaulieu, J. B		1							
Behan, J. J				1	1	1			
Bélair, A. (Plessis dit)		1							
Bell, James E.		1							
Belleperche, H. J. E		1							
Bellerive, Geo			1						
Belyea, T. H		1							
Bickle, J. W		1			1				
Bish, Philip		1							
Bishop, A		1							
Bishop, J. B		1							
Blackman, C		1							
Blair, A		1							
Blair, J. B		1							
Blatch, F. K	1								
Blethen, C. W		1							
Blyth, Alex		1							
Boivin, C. A		1							
Boomer, J. B		1							
Bouchette, R. E	1								
Bourassa, Joseph		1							
Bourget, O		1							
Bouteiller, G. A		1							
Bowman, Allan		1							
Boyd, J. F. S		1							
Boyd, S. I		1							
Boyle, P		1							
Bowen, F. C		1			1	1			
Brabant, J. B. G. N		1							
Brain, A. F		1							
Breen, John				1					
Brennan, D. J		1							
Brennan, John		1							
Broadfoot, S		1			1				
Browne, G. W		1							
Bruyère, H. P		1							
Bulmer, Wm		1							
Burgess, Thomas H				1					
Burke, T		1							
Burns, John	1								
Byrnes, John	1								

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1899–1900—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Cahill, J. H		1							
Cahill, J. W		1							
Cameron, D. M.		1			1				
Campeau, F. R. E	1								
Cargill, W.		1							
Carroll, D		1							
Carter, William	1								
Casey, John							1		
Caven, A.		1							
Caven, W.		1							
Chabot, F. X				1					
Chalus, J. O				1					
Chartier, Etienne		1							
Chisholm, J. J				1					
Chisholm, W. Noble		1							
Clark, A. F.		1							
Clark, James Alfred		1							
Clarke, Thomas		1							
Codd, Herbert J. S		1							
Code, Abraham		1						1	
Coleman, Charles		1							
Coleman, J. J		1							
Coles, F. H.		1							
Comte, L. A. A. J		1							
Conklin, Ewan		1							
Conway, B. J.		1							
Cook, W. R		1							
Costello, J. W.				1					
Costigan, H. A.		1							
Costigan, J. J		1						1	
Coughlin, D.				1					
Coulter, Alex		1							
Courtney, J. J		1							
Cowan, Edgar				1					
Crawford, W. P		1							
Croteau, T. M			1						
Crotty, John		1							
Crowe, W		1							
Daoust, J. A				1					
Daveluy, J. P		1							
Davis, T. G		1							
Davy, Edward				1	1				
Dawson, W		1							
Deland, A. N.		1							
Dennis, W. A					1				
Desaulniers, J. E. A		1							
Desmarais, F.		1							
Dessert, Victor				1					
Dibblee, William		1							
Dick, J. W		1							
Dickson, C. T		1							
Dingman, N. J.		1							
Dixon, H. G. S.		1							
Dodds, E. W		1							
Donaghy, William		1							
Doyle, B. J.		1							
Doyle, J. E. H.		1							
Doyon, J. A	1								
Dudley, W. H		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1899–1900—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Dunne, J. P.	1								
Dumbrille, J.		1							
Dumbrille, R. W.		1							
Dumouchel, Léandre		1							
Dunlop, C.		1							
Duplessis, C. Z.		1							
Dustan, W. W.				1					
Earle, R. H.		1							
Egan, Wm.		1							
Egener, A.		1							
Elliott, T. H.		1		1					
Errett, R. W.				1					
Evans, G. T.		1							
Fahey, Ed.		1							
Falconer, James E.		1							
Ferguson, J.		1						1	
Ferguson, John C.		1							
Finley, Hugh				1					
Fitzgerald, E. W.				1					
Fitzpatrick, W. J.		1							
Fletcher, R. W.		1						1	
Flynn, D. J.		1							
Forest, E. R.		1							
Fortier, J. J. O.		1							
Fortier, V.		1							
Foster, Henry		1							
Fournier, L. A.				1					
Fowler, George	1								
Fowler, J. D.					1				
Fox, J. D.		1							
Fox, Thomas		1							
Frame, Archibald				1					
Francis, G. M.				1					
Fraser, G. J.		1							
Fraser, P.		1							
Freed, A. T.				1					
Gallagher, F.			1						
Geldart, O. A.		1							
George, John		1							
Gerald, C.		1							
Gerald, W. H.		1							
Gerald, W. J.	1	1							
Gervais, Samuel				1					
Gill, Wm.		1							
Girard, Irené		1							
Girdlestone, R. J. M.		1		1					
Goodman, A. W.		1							
Gorman, Arthur M.		1							
Gosnell, T. S.		1		1					
Gow, James		1							
Gow, J. E.		1			1				
Graham, W. J.		1							
Graham, W. T.		1							
Grant, H. H.		1							
Gravel, A. I.				1					
Grimason, Thomas		1							
Grosbois (de), Chas. B.		1							
Guay, Alphonse				1					
Guay, G. N.				1					

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1899–1900—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Hagan, James		1							
Hagarty, P.		1							
Hall, C. R.	1								
Hall, J. J		1							
Halliday, W. A	1								
Hanley, A		1							
Harney, Thomas			1						
Harris, J. G		1							
Hart, P. D		1							
Hawkins, A. C		1							
Hawkins, W. L		1							
Hayhurst, T. H		1							
Hayward, W. J.				1					
Hébert, C. D		1							
Hébert, J. A. P.				1					
Helliwell, H. N		1							
Henderson, W		1							
Henwood, Geo		1							
Hesson, C. A		1							
Hicks, W. H		1			1				
Higman, O						1			
Hill, A. M		1							
Himsworth, Wm	1								
Hobbs, G. N		1							
Howard, W. W. S		1							
Howden, R		1							
Howell, Thomas		1							
Howie, A		1							
Hubley, H. H		1							
Hudon, L. E	1								
Hughes, Henry				1					
Hughes, P. A	1								
Hughes, R. A				1					
Hurst, Levi B		1							
Iler, B		1							
Ironside, G. A		1							
Irwin, Robert		1							
Irwin, Samuel				1					
Ives, G. C		1							
James, T. C		1							
Jameson, S. B		1							
Jamieson, R. C		1							
Jarvis, Henry				1					
Johnson, J. J		1							
Johnson, Wm				1	1	1			
Johnston, G. E		1							
Johnstone, J. K					1	1			
Jones, Andrew		1							
Jones, Richard		1			1	1			
Jubenville, J. P		1							
Keeler, G. S		1							
Keilty, T		1							
Kelly, M. J				1					
Kenning, J. H		1							
Keogh, P. M		1							
Kidd, Thomas								1	
Kilroy, E. T.		1							
King, R. M		1							
Knowlson, J. B		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1899–1900—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Laidman, Richard H				1					
Lane, T. M		1							
Laporte, Geo		1							
LaRivière, A. C		1							
LaRue, George		1							
LaRue, J. B. Alexandre		1							
Lawlor, H		1							
LeBel, J. A. W	1								
Lecours, H. T		1							
Lee, Edward		1							
LeMoine, Jas. Sir		1							
LeMoine, Jules		1							
Lépine, Louis		1							
LeVasseur, N					1	1			
Levêque, Hector								1	
Logan, John		1							
Lyons, E		1							
Macdonald, A. B		1							
Macdonald, D		1							
Macdonald, J. A				1					
Macfarlane, Thos								1	
Macintyre, D		1							
Mackay, G. W		1							
Magness, Robt				1	1	1			
Mainville, C. P		1							
Male, Thomas					1				
Malo, T		1							
Manning, J		1							
Marcon, F. E		1							
Marentette, Alex				1					
Marion, J. E. E		1							
Marshall, F		1							
Mason, F		1							
Metcalf, W. F		1							
Miall, E	1			1					
Miller, A					1	1			
Miller, J. E		1			1	1			
Miller, W. F		1							
Millier, Elie		1							
Milligan, R. J				1					
Milliken, E		1							
Moore, T		1							
Moreau, J. Alf				1	1				
Mulhern, M. M		1			1				
Munro, H. D		1			1				
Murdoch, James				1					
Murray, A. S. E		1							
Murray, David		1							
McAllister, A		1							
McAloney, Joseph A		1		1	1				
McCloskey, J. R		1							
McCoy, Wm		1							
McCuaig, Aug. F		1							
McCullough, A	1								
McDonald, A. W				1					
McDonald, J				1					
McFarlane, C. D		1							
McFarlane, J				1					
McFee, A. C		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1899–1900—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
McGill, A.								1	
McLenaghan, N.		1							
McPhie, Donald					1	1			
McSween, James		1							
Nash, S. C.		1							
Newby, F.	1								
Nichols, J. T.		1							
O'Brien, E. C.		1							
O'Brien, J. F.		1							
O'Donnell, J.		1							
O'Donohue, M. J.		1							
O'Flaherty, E. J.		1							
O'Flaherty, M. J.					1				
O'Leary, T. J.		1							
Orr, Henry N.		1							
Osborne, F. A.		1							
O'Sullivan, D.		1							
Panneton, G. E.		1							
Pape, James					1	1			
Parent, F.		1							
Parkinson, Edward B.		1							
Parsons, C. H.		1							
Patton, James			1						
Pelletier, N. G.		1							
Petit, J. B.				1					
Pinhey, Henry				1					
Pinsonnault, Alfred		1							
Poirier, Joseph A.		1							
Pole, C. W.		1							
Potvin, Napoléon	1								
Powell, J. B.		1							
Prosser, Elijah							1		
Provost, J. T.				1					
Quain, Redmond	1								
Quinn, J. D.		1							
Renaud, A. H.		1							
Rennie, George		1			1				
Richard, D.				1					
Ridgman, A. H.		1							
Roche, H. G.					1	1			
Ross, H. E.		1		1					
Ross, S. F.		1							
Rouleau, J.		1							
Rousseau, Elzéar H.		1							
Rowan, W. E.		1							
Roy, George									1
Ryan, Wm.		1							
Saucier, X.		1						1	
Schram, R. L. H.		1							
Scullion, P. J.		1							
Scullion, W. J.		1							
Shanacy, M.		1			1				
Shaw, J. F.	1								
Simpson, A. F.		1			1	1			
Simon, E. H.		1							
Slattery, R.		1							
Slattery, Thomas					1				
Smyth, B. B.		1							
Snowdon, J. W.		1							

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1899–1900—*Concluded.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Spence, F. H		1							
Spence, John		1							
Speremau, J. J		1							
Standish, J. G		1							
Stevens, D. B		1							
Stewart, James		1							
St. Michel, F. X		1							
Stratton, W. C		1							
Swannell, F. W		1							
Talbot, John		1							
Taylor, G. W		1							
Thomas, J. S				1					
Thomas, Philip		1					1		
Thomas, Robert		1							
Till, T. M		1							
Timmons, P		1							
Tomlinson, W. M				1					
Tompkins, P		1							
Toupin, F. X. J. A		1							
Tourchot, A. L								1	
Tracey, J. P		1							
Tyrrell, M								1	
Valin, J. E	1								
Vernei, Francis		1							
Verner, Thomas H		1		1				1	
Villeneuve, J		1							
Wainright, F. G		1							
Waller, J		1							
Walsh, Daniel J		1							
Wardell, R. S. R		1							
Watson, James								1	
Watson, W. W		1							
Waugh, R. J				1				1	
Webbe, C. E. A		1							
Weir, James		1							
Westman, T	1								
Weyms, C		1							
Wheatley, Alfred E				1					
Whelan, W. F			1						
Whitehead, J. P		1							
Wilmot, J. B				1					
Wilson, David		1							
Winsor, John A				1					
Winter, C. F	1								
Wolfenden, William		1			1				
Wood, James A		1							
Woodward, G. W		1							
Wright, Robert J				1					
Yetts, R. P	1								
Totals	26	295	6	61*	32	15	3	14	1

APPENDIX B—*Continued.*

No. 11.—List of Persons employed by the Inland Revenue Department on salary, during a portion of the Year ended June 30, 1900.

Names.	Period.	Services. Excise.	Weights and Measures.	Gas.	Electric Light.	Preventive.
Atkins, B. R.	From April 5, 1900, to June 30, 1900	1				
Bennett, James	" March 8, 1900, to June 30, 1900	1				
Berry, H. L.	" January 5, 1900, to June 30, 1900	1				
Boudet, E.	" February 1, 1900, to June 30, 1900		1			
Bousquet, J. O.	" January 12, 1900, to June 30, 1900	1				
Brace, R. K.	" July 1, 1899, to January 31, 1900			1		
Browne, J. W.	" May 28, 1900, to June 30, 1900					1
Cahill, T.	" July 1, 1899, to May 31, 1900	1	1			
Collins, D.	" December 13, 1899, to June 13, 1900		1			
David, T.	" May 1, 1900, to June 30, 1900					1
Davis, J.	" August 25, 1899, to June 30, 1900	1				
Fahey, Owen	" July 1, 1899, to November 30, 1899	1				
Falconer, R. H.	" January 25, 1900, to June 30, 1900	1				
Floody, E.	" April 16, 1900, to June 30, 1900					1
Graham, A. L.	" February 12, 1900, to June 30, 1900	1				
Kelly, Daniel	" January 1, 1900, to June 30, 1900		1			
Kearny, D. J.	" December 1, 1899, to June 30, 1900	1				
Langlois, J. H.	" July 1, 1899, to October 31, 1899		1			
Laurier, J. L.	" October 1, 1899, to June 30, 1900	1				
Long, W. H. A.	" June 14, 1900, to June 30, 1900	1				
Lyons, K.	" July 1, 1899, to August 31, 1899	1		1		
Mills, A. E.	" July 1, 1899, to February 28, 1900	1				
Morrow, J.	" July 1, 1899, to December 31, 1899	1				
McCraney, H. P.	" September 1, 1899, to June 30, 1900	1				
McCutcheon, H. M.	" September 7, 1899, to June 30, 1900	1				
McDonald, J. A.	" July 1, 1899, to November 30, 1900	1				
Nash, A. F.	" December 12, 1899, to June 30, 1900			1	1	
Neville, C.	" July 1, 1899, to January 31, 1900	1				
O'Meara, F. M.	" July 1, 1899, to August 31, 1900	1				
Piper, H.	" July 1, 1899, to December 31, 1899		1			
Poirrier, J. N.	" February 2, 1900, to June 30, 1900	1				
Pringle, James	" July 1, 1899, to December 31, 1899	1				
Ramon, P.	" July 1, 1899, to May 31, 1900	1				
Richard, J. B. T.	" July 1, 1899, to April 30, 1900	1				
Rinfret, C. I.	" August 25, 1899, to August 31, 1899	1				
Ritchie, A. J.	" April 1, 1900, to June 30, 1900			1		
Rowan, A.	" July 1, 1899, to January 31, 1900			1	1	
Rudkins, W.	" June 26, 1900, to June 30, 1900	1		1	1	
Scott, M. W.	" July 1, 1899, to October 31, 1899	1				
Sexton, John	" July 1, 1899, to December 25, 1899	1				
Stuart, A. K.	" July 1, 1899, to September 7, 1899	1				
Thorburn, James	" February 8, 1900, to June 30, 1900	1				
Vallerand, Olivier	" February 8, 1900, to June 30, 1900	1				
Watkins, J. A.	" July 1, 1899, to May 31 1900	1				
Wilson, J. E.	" April 26, 1900, to June 30, 1900			1	1	
	Totals	32	6	7	4	3

APPENDIX B—*Concluded.*

List of Persons employed by the Inland Revenue Department on salary, during the Year ended June 30, 1900—*Concluded.*

RECAPITULATION.

Employed during the year	403
" a portion of the year	45
Total	448

SERVICES.

Employed in the Inside Service	24
" Excise	297
" Culler's Office	6
" Weights and Measures	53
" Gas	7
" Electric Light Inspection	1
" Preventive Service	5
" Food Inspection	7
" Inspection of Staples	1
" Inside and Excise Service	1
" " Weights and Measures	1
" Excise and Preventive	1
" " Weights and Measures and Food Inspection	1
" " Gas	11
" " Food Inspection	5
" Weights and Measures and Gas	2
" " " Food Inspection	1
" Gas and Electric Light	10
" Excise, Gas and Electric Light	5
" " " Weights and Measures	1
" Weights and Measures, Gas and Electric Light	3
" " " and Excise	5
Total corresponding with above	448

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, September 22, 1900.

INDEX.

SESSIONAL PAPER No. 12

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1900

PART II

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1900

REPORT

OF THE

COMMISSIONER OF INLAND REVENUE

ON THE

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

To the Honourable
The Minister of Inland Revenue.

Sir,—I have the honour to submit herewith my annual report on the inspection of weights and measures, gas and electric light, with the usual statements in connection therewith, for the fiscal year ended June 30, 1900.

1. The total revenue collected during the year for the inspection of weights and measures was $53,635.04, as against $48,453.95 collected during the year ended June 30, 1899.

2. The total expenditure was $68,707.55, as against $63,643.31 expended during the year ended June 30, 1899.

3. Appendix "A" gives a summary statement of the receipts and expenditures of each inspection division.

4. In Appendices "B," "C" and "D" will be found a detailed statement of weights, measures and weighing machines presented for verification, verified and rejected during the year. The number of all descriptions may be summarily stated as follows:—

——	Presented.	Verified.	Rejected.	Percentage of Rejections.
Weights, Dominion	68,471	67,731	740	1·08
Measures of capacity, Dominion	80,070	79,805	265	0·33
Lineal measures	6,221	6,087	134	2·15
Balances, equal arms	13,838	13,483	355	2·56
" steelyards	4,231	4,091	140	3·30
" platform scales	32,123	31,093	1,030	3·20
Troy weights	21	21	....	... ...
Irregular weights	4,890	4,672	218	4·45
" measures	661	661	....	....

Inspection of Gas.

5. The total revenue collected during the fiscal year ended June 30, 1900, for the inspection of gas and gas meters, was $21,106.75, as compared with $18,617.00 collected during the year ended June 30, 1899.

6. The total expenses were $22,706.16, as against $20,029.28 expended during the year ended June 30, 1899.

7. Appendix "E" gives a summary statement of the receipts and expenditures of each gas inspection district.

8. A statement of the illuminating power and purity of gas inspected during the year will be found in Appendix "F."

9. The illuminating power, where inspection has been made, has been as follows:—

Places.	Number of Tests made.	Number of times below Standard.	Places.	Number of Tests made.	Number of times below Standard.
Barrie	12	....	Sarnia	11	....
Belleville	32	....	Stratford	12	....
Berlin	12	....	St. Catharines	12	....
Brantford	12	....	St. Thomas	6	....
Brockville	12	....	Toronto	104	....
Chatham	6	....	Windsor	9	1
Cobourg	12	....	Woodstock	8	....
Cornwall	12	....	Montreal	104	....
Deseronto	14	....	Quebec	12	....
Dundas	12	....	Sherbrooke	12	....
Galt	12	....	Fredericton	82	....
Guelph	12	....	Moncton	6	2
Hamilton	16	....	St. John, N.B	49	....
Ingersoll	7	....	Halifax	18	....
Kingston	28	....	Pictou	9	....
Listowell	10	....	Yarmouth	9	....
London	13	....	Charlottetown	26	....
Napanee	11	....	Winnipeg	12	....
Ottawa	24	....	Nanaimo	12	....
Owen Sound	12	....	Vancouver	12	....
Peterborough	10	....	Victoria	11	....
Port Hope	12	....			

The revenue derived from the inspection of electric light was as follows :—

Fees for inspection of meters, &c. ....$	9,824 25
Registration of companies	4,592 50
	$ 14,416 75
The expenses of inspection (annual)................	3,718 32
	$ 10,698 43
Expended on standard instruments, &c...............	959 41
Leaving a net revenue of........................ .$	9,739 02

It will thus be seen that the two services of gas and electric light inspection, which are conducted largely by the same staff of officers, have now reached that point at which they have ceased to be a burden upon the general taxpayer, as shown below :—

Service.	Revenue.	Expenditure.
	$ cts.	$ cts.
Gas..	21,106 75	22,706 16
Electric light	14,416 75	3,718 32
Exclusive of cost of standard instruments	35,523 50	26,424 48

The kindred service of weights and measures inspection, it will be observed, has earned somewhat over three-fourths of its annual cost, the expenditure as already stated having been $68,707.55, against a revenue of $53,635.04.

In view of the fact that three-fourths of the cost is contributed directly by the trading community, it is felt by the department that the general taxpayer, who is guaranteed, thereby, just weights and measures in all his dealings, should not complain in that he is called upon to contribute the remaining fourth.

I have the honour to be, sir,
Your obedient servant,
EDWARD MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX A.

STATEMENT of Weights and Measures Expenditures and Revenues, for the Year ended June 30, 1900.

Inspection Divisions.	Inspectors and Assistants.	Expenditures. Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	Revenues
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville...	Johnson, Wm.. Slattery, T..... Irwin, S........ Behan, J. J ... Errett, R. W... Jonhston, C. W.	3,399 92	......	541 58	230 00	965 84	387 68	5,525 02	4,084 35
Hamilton...	Freed, E. T.... McDonald, J... Marentette, A.. Fitzgerald, E.W Laidman, R. H. Wheatley, A. E. Jarvis, H.	5,721 77	.....	....	....	972 02	99 03	6,792 82	9,355 70
Ottawa.....	Macdonald, J.A. Breen, J........ McFarlane, J... Winsor, J. A... Elliott, T. H...	3,659 96	.....	....	250 00	957 24	186 76	5,053 96	3,385 20
Toronto	Piper, H.. ..... Kelly, D....... Milligan, R. J.. Wright, R...... Smith, J. C.... Murdoch, J....	3,999 94	.....	....	....	1,529 18	95 30	5,624 42	6,383 46
Windsor....	Hayward, W. J. Coughlin, S.... Thomas, J. S... Hughes, R. H..	3,449 76	.....	....	....	928 48	156 18	4,534 42	5,519 25
	Ontario	20,231 35	.....	541 58	480 00	5,352 76	924 95	27,530 64	28,727 96

APPENDIX A—*Continued.*

STATEMENT of Weights and Measures Expenditures and Revenues, &c.—*Continued.*

Inspection Divisions.	Inspectors and Assistants.	Expenditures. Salaries.	Salaries expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	Revenues
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Montreal...	Chalus J. O.... Daoust, J. A... Gervais, S.. ... Hébert, J. A. P. Langlois, J. H.. Baker, J. S. ... Dessert, V...... Tomlinson, W. M Fournier, L. A.. Collins, D .. Boudet, E.. . .	7,440 70	...	......	......	1,630 04	296 30	9,367 04	11,364 04
Quebec.....	Guay, G. N.... Kelley, M. J... Pinhey, H...... Chabot, F. X... Guay, A.. ... . Petit, J. B..... Moreau, A.....	4,633 27	....	......	200 00	1,221 20	79 52	6,133 99	3,011 25
Three Rivers	Gravel, A. I.... Provost, J. J...	1,699 96	2 50	......	......	661 05	17 40	2,380 91	1,905 45
	Quebec	13,773 93	2 50	....	200 00	3,512 29	393 22	17,881 94	16,280 74
St. John....	Wilmot, J. B... Cowan, E ... Richard, D.....	2,500 00	.....	....	......	465 52	19 47	2,984 99	1,484 93
	New Brunswick.	2,500 00	...	......	....	465 52	19 47	2,984 99	1,484 93
Cape Breton	Lawrence, G. C..	800 00	.....	....	83 33	198 25	52 16	1,133 74	129 68
Halifax.....	Frame, A.. . Waugh, R. J...	1,599 96	...	....	225 00	182 55	153 95	2,161 46	822 38
Pictou......	Dustan, W. M.. Chisholm, J. J..	1,600 00	...	....	......	285 57	50 64	1,936 21	838 20
	Nova Scotia....	3,999 96	......	....	308 33	666 37	256 75	5,231 41	1,790 26
Charlottet'n.	Davey, E. ... Hughes, H.....	1,500 00	...	....	....	185 75	41 04	1,726 79	404 54

APPENDIX A—*Concluded.*

STATEMENT of Weights and Measures Expenditures and Revenues, &c.—*Concluded.*

Inspection Divisions.	Inspectors and Assistants.	Expenditures.							Revenues
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Winnipeg...	Magness, R. .. McDonald, A.W Francis, G. M.. Girdlestone, R. J. M......... Ross, H. E.....	2,844 17	....	700 08	108 00	1,403 00	129 41	5,184 66	3,774 96
Calgary	Thomas, P...... Costello, J. W..	899 92	....	....	....	174 25	2 71	1,076 88	379 45
Victoria	Findley, H. .... McAloney, J. A	1,149 84	..	......	......	1,066 55	67 75	2,284 14	792 20

RECAPITULATION.

	Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	Revenues
Ontario ...	20,231 35	..	541 58	480 00	5,352 76	924 95	27,530 64	28,727 96
Quebec ...	13,773 93	2 50	....	200 00	3,512 29	393 22	17,881 94	16,280 74
New Brunswick....	2,500 00	......	....	......	465 52	19 47	2,984 99	1,484 93
Nova Scotia ...	3,999 96	......	....	308 38	666 37	256 75	5,231 41	1,790 26
Prince Edward Island.........	1,500 00	......	......	......	185 75	41 04	1,726 79	404 54
Manitoba ...	2,844 17	......	700 08	108 00	1,403 00	129 41	5,184 66	3,774 96
North-west Territories.....	899 92	....	....	......	174 25	2 71	1,076 88	379 45
British Columbia....	1,149 84	...	......	......	1,066 55	67 75	2,284 14	792 20
Commissioner of Standards....	800 00	....	......	....	....	....	800 00	....
General ...	....	.....	....	....	....	16 27	16 27	....
General Gontingencies....	....	....	....	....	....	2,878 82	2,878 82	....
Printing ...	.....	..	....	....	....	520 19	520 19	....
Stationery.......	....	.....	.....	....	....	280 82	280 82	....
Lithographing......	....	......	......	....	......	7 00	7 00	....
Totals	47,699 17	2 50	1,241 66	1,096 33	12,826 49	5,538 40	68,404 55	53,635 04

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province,

Inspection Divisions.	Weights.								Measures of Capacity.				
	Dominion.			Troy.		Miscellaneous.			Dominion.			Miscellaneous.	
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.
Ontario.													
Belleville	3,510	3,510	...	...	...	Scales 30 2	30 2	..	6,478	6,478	....	4	4
Hamilton	15,369	15,288	81	21	21	Sc'les 1,710 16	1,710 16	.	4,952	4,949	3	8	8
Ottawa	2,226	2,117	109	....	.	Sc'les 1,571	1,360	211	2,161	2,044	117	2	2
Toronto	4,806	4,806	..	....	....	Scales 489	489	....	11,272	11,272	...	156	156
Windsor	6,150	6,150	....	...	..	... .	.....	..	12,348	12,348	....	....	....
Totals	32,061	31,871	190	21	21	3,818	3,607	211	37,211	37,091	120	170	170
Quebec.													
Montreal	16,101	15,574	527	...	..	Scales 245 65	240 64	5 1	23,559	23,546	13	312	312
Quebec	8,004	7,984	20	...	...	Scales 12 472	12 471	1	5,943	5,934	9	....	....
Three Rivers	4,398	4,398	.	....	....	Scales 43	43	....	3,095	2,973	122	....	....
Totals	28,503	27,956	547	...	....	837	830	7	32,597	32,453	144	312	312
New Brunswick.													
St. John	2,540	2.540	....	....	..	Scales 15 31	46	....	5,055	5,054	1	10	10
Nova Scotia.													
Cape Breton	163	163	....	...	...	....	.....	...	69	69	....	...	.. .
Halifax	1,244	1,244	..	....	.	Scales 63 69	63 69	..	1,264	1,264	...	91	91
Pictou	1,062	1,059	3	....	..	Scales 17 17	17 17	..	1,090	1,090	...	14	14
Totals	2,469	2,466	3	....	....	166	166	....	2,423	2,423	....	105	105
Prince Edward Island.													
Charlottetown	648	648	...	....	...	Scales 13	13	....	249	249	....	....	....
Manitoba.													
Winnipeg	1,430	1,430	....	....	....	1	1	....	1,970	1,970	...	62	62
Calgary	260	260	....	...	...	Scales 2	2	. ..	415	415	....	2	2
Totals	1,690	1,690	....	...	....	3	3	....	2,385	2,385	...	64	64
British Columbia.													
Victoria	560	560	....	....	...	Scales 7	7	....	150	150	....	....	....

B

1900, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

Measure of Length.			Balances, &c.								
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
423	423	.....	572	572	....	131	131	....	2,269	2,269	....
465	381	84	3,914	3,819	125	1,774	1,713	61	7,096	6,540	556
370	368	2	388	335	53	18	15	3	1,555	1,434	121
899	899	......	952	952	....	411	411	....	2,628	2,628	....
308	308	.....	1,107	1,102	5	363	363	....	3,220	3,198	22
2,465	2,379	86	6,963	6,780	183	2,697	2,633	64	16,768	16,069	699
2,175	2,154	21	3,497	3,373	124	1,132	1,067	65	7,609	7,391	218
881	878	3	1,179	1,177	2	97	97	....	1,677	1,673	4
252	229	23	697	659	38	32	32	....	990	965	25
3,308	3,261	47	5,373	5,209	164	1,261	1,196	65	10,276	10,029	247
2	2	....	460	459	1	41	41	....	925	921	4
30	29	1	31	31	....	6	6	....	80	78	2
15	15	.....	235	233	2	11	11	....	517	501	16
107	107	....	195	195	....	28	28	....	540	540	....
152	151	1	461	459	2	45	45	....	1,137	1,119	18
1	1	......	130	130	....	16	16	....	305	305	....
178	178	...	278	273	5	131	120	11	1,965	1,906	59
115	115	...	45	45	....	2	2	......	250	247	3
293	293	.....	323	318	5	133	122	11	2,215	2,153	62
....	......	.....	128	128	....	38	38	....	497	497	....

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province,

RECAPIT

Inspection Divisions.	Weights.								Measures of Capacity.				
	Dominion.			Troy.		Miscellaneous.			Dominion.			Miscellaneous.	
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.
Ontario	32,061	31,871	190	21	21	3,818	3,607	211	37,211	37,091	120	170	170
Quebec	28,503	27,956	547	....	....	837	830	7	32,597	32,453	144	312	312
New Brunswick	2,540	2,540	....	....	....	46	46	....	5,055	5,054	1	10	10
Nova Scotia	2,469	2,466	3	....	...	166	166	....	2,423	2,423	...	105	105
Prince Edward Island	648	648	..	....	...	13	13	...	249	249	....	....	...
Manitoba	1,690	1,690	....	...	....	3	3	...	2,385	2,385	....	64	64
British Columbia	560	560	...	....	....	7	7	..	150	150	....	....	....
Grand totals	68,471	67,731	740	21	21	4,890	4,672	218	80,070	79,805	265	661	661

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

B—*Concluded.*

1900, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

ULATION.

Measures of Length.			Balances, &c.								
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
2,465	2,379	86	6,963	6,780	183	2,697	2,633	64	16,768	16,069	699
3,308	3,261	47	5,373	5,209	164	1,261	1,196	65	10,276	10,029	247
2	2	......	460	459	1	41	41	....	925	921	4
152	151	1	461	459	2	45	45	....	1,137	1,119	18
1	1	.....	130	130	....	16	16	....	305	305	....
293	293	......	323	318	5	133	122	11	2,215	2,153	62
....	....	.....	128	128	....	38	38	......	497	497	....
6,221	6,087	134	13,838	13,483	355	4,231	4,091	140	32,123	31,093	1,030

E. MIALL,
Commissioner.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each Fiscal Year ended

Inspection Divisions.	Dominion													
	Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville	....	40	....	....	6	8	122	171	346	621	637	425	378	311
Hamilton	....	50	...	....	8	3	454	192	3,128	4,069	4,024	793	684	660
Ottawa	....	...	....	....	...	1	131	151	374	416	386	251	200	153
Toronto	....	6	2	3	23	4	132	210	548	1,006	928	464	405	387
Windsor	..	5	....	1	11	5	110	280	518	1,186	1,139	659	629	589
Totals	....	101	2	4	43	26	949	1,004	4,914	7,298	7,114	2,592	2,296	2,100
Quebec.														
Montreal	418	45	9	11	*1 54	39	659	881	1,280	3,232	2,859	1,865	1,661	1,399
Quebec	...	103	20	26	63	202	448	587	502	1,127	1,109	1,026	993	854
Three Rivers	....	12	3	5	17	7	306	368	455	728	684	617	549	378
Totals	418	160	32	42	135	248	1,413	1,836	2,237	5,087	4,652	3,508	3,203	2,631
New Brunswick.														
St. John	....	52	4	7	13	27	113	186	195	601	473	269	214	188
Nova Scotia.														
Cape Breton	....	...	...	....	3	....	8	1	21	52	38	15	12	12
Halifax	....	35	...	...	4	26	55	35	136	294	227	142	114	87
Pictou	..	25	6	7	8	5	32	50	116	234	205	97	90	78
Totals	....	60	6	7	15	31	95	86	273	580	470	254	216	177
Prince Edward Island.														
Charlottetown	....	....	...	....	....	1	18	15	66	174	135	67	58	48
Manitoba.														
Winnipeg	...	52	....	....	5	2	43	27	233	325	268	110	93	86
Calgary	....	..	....	.. .	...	...	10	1	39	53	44	21	21	21
Totals	....	52	....	....	5	2	53	28	272	378	312	131	114	107
British Columbia.														
Victoria	....	....	....	....	1	1	7	11	74	144	123	62	50	46

*14 lbs.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

C.

Denomination presented for Verification in each Inspection Division, during the June 30, 1900.

Weights.									Lineal Measures.											
dupois																				
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.	Troy Weight.	Miscellaneous Weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	Miscellaneous Measures.
264	139	26	11	5	...	3,510	..	Scales 30 1	...	....	423	..	..	..	..	..	..	...	423	.
663	504	114	13	9	1	15,369	21	" 1,710 16	...	...	461	4	..	..	..	..	..	...	465	....
102	39	13	5	2	2	2,226	....	" 1,571	...	...	370	.	..	..	..	..	.	....	370	...
323	204	88	33	40	...	4,806	....	" 489	...	...	899	..	..	..	..	..	..	....	899	....
523	336	130	19	10	....	6,150	...	....	....	....	308	.	..	..	..	..	..	...	308	. .
1,875	1,222	371	81	66	3	32,061	21	3,817	....	....	2,461	4	..	..	..	..	..	...	2,465	....
961	470	137	60	59	1	16,101	..	Scales 245 65	..	12	2,163	..	..	..	..	..	..	....	2,175	....
733	189	21	1	....	....	8,004	..	" 12 472	..	....	881	..	..	..	..	.	..	...	881	....
215	50	4	....	....	...	4,398	...	" 43	....	1	251	..	..	..	..	..	..	....	252	...
1,909	709	162	61	59	1	28,503	...	837	...	13	3,295	..	..	..	..	..	..	....	3,308	....
153	42	3	....	...	...	2,540	..	Scales 15 31	1	....	1	..	..	..	..	..	..	...	2	....
1	......	....	...	....	...	163	....	....	...	....	30	..	..	..	..	..	..	..	30	....
56	20	13	...	....	....	1,244	..	Scales 63 69	..	....	15	..	..	..	..	..	..	...	15	...
67	31	10	1	..	....	1,062	..	" 17 17	..	...	107	..	..	..	..	..	..	....	107	....
124	51	23	1	....	...	2,469	..	166	...	...	152	..	..	..	..	..	.	....	152	...
43	14	6	1	2	...	648	....	Scales 13	...	...	1	..	..	..	..	..	..	....	1	. .
79	48	35	11	7	6	1,430	....	1	....	....	178	..	..	..	..	..	..	....	178	. .
18	15	8	4	5	...	260	...	Scales 2	...	....	113	2	..	..	..	..	..	....	115	....
97	63	43	15	12	6	1,690	.	3	....	...	291	2	..	..	..	..	..	....	293	...
38	3	....	...	...	...	560	..	Scales 7	..	....	....	..	..	..	..	..	..	....	.. ..	....

E. MIALL
Commissioner.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each
Year ended

Inspection Divisions.	Dominion													
	Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville	...	40	....	....	6	8	122	171	346	621	637	425	378	311
Hamilton	....	50	....	...	3	8	450	190	3,121	4,055	4,008	782	674	649
Ottawa	....	....	....	....	....	1	111	123	348	400	377	241	200	153
Toronto	...	6	2	3	23	4	132	210	548	1,006	928	464	405	387
Windsor	....	5	. .	1	11	5	110	280	518	1,186	1,139	659	629	589
Totals	....	101	2	4	43	26	925	974	4,881	7,268	7,089	2,571	2,286	2,089
Quebec.														
Montreal	418	45	9	11	*1 / 54	37	634	846	1,233	3,136	2,768	1,777	1,592	1,349
Quebec	....	103	20	26	63	202	448	584	502	1,121	1,104	1,022	992	854
Three Rivers	...	12	3	5	17	7	306	368	455	728	684	617	549	378
Totals	418	160	32	42	135	246	1,388	1,798	2,190	4,985	4,556	3,416	3,133	2,581
New Brunswick.														
St. John	...	52	4	7	13	27	113	186	195	601	473	269	214	188
Nova Scotia.														
Cape Breton	. .	....	....	...	3	...	8	1	21	52	38	15	12	12
Halifax	....	35	....	...	4	26	55	35	136	294	227	142	114	87
Pictou	....	25	6	7	8	5	32	50	116	234	205	97	90	77
Totals	....	60	6	7	15	31	95	86	273	580	470	254	216	176
Prince Edward Island.														
Charlottetown	....	...	....	....	.	1	18	15	66	174	135	67	58	48
Manitoba.														
Winnipeg	..	52	....	....	5	2	43	27	233	325	268	110	93	86
Calgary	....	....	. .	....	....	....	10	1	39	53	44	21	21	21
Totals	...	52	....	....	5	2	53	28	272	378	312	131	114	107
British Columbia.														
Victoria	....	....	...	...	1	1	7	11	74	144	123	62	50	46

*14 lbs.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

C—*Continued.*

Denomination, Inspected and Verified in each Inspection Division, during the Fiscal June 30, 1900.

Weights.										Lineal Measures.										
dupois.																				
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.	Troy Weight.	Miscellaneous Weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	Miscellaneous Measures.
264	139	26	11	5	...	3,510	..	Scales 30 1	..	....	423	..	..	..	..	..	..	..	423	....
658	504	113	13	9	1	15,288	21	" 1,710 16	..	....	377	4	..	..	..	..	..	....	381	....
102	39	13	5	2	2	2,117	....	" 1,360	....	....	368	.	..	..	..	..	..	....	368	....
323	204	88	33	40	....	4,806	....	" 489	...	....	899	..	..	..	..	..	..	....	899	...
523	336	130	19	10	....	6,150	...	....	....	....	308	..	..	..	..	..	..	....	308	....
1,870	1,222	370	81	66	3	31,871	21	3,606	..	....	2,375	4	..	..	..	..	..	...	2,379	....
941	467	136	60	59	1	15,574	..	Scales 240 64	..	12	2,142	..	..	..	..	..	..	..	2,154	....
733	188	21	1	....	....	7,984	..	" 12 471	..	....	878	..	..	..	..	..	..	....	878	....
215	50	4	....	..	....	4,398	....	" 43	..	1	228	..	..	..	..	..	..	..	229	....
1,889	705	161	61	59	1	27,956	....	830	....	13	3,248	..	..	..	..	..	..	....	3,261	....
153	42	3	....	....	....	2,540	..	Scales 15 31	1	....	1	..	..	..	..	..	..	..	2	....
1	...	....	....	...	....	163	....	....	....	...	29	..	..	..	..	..	..	....	29	....
56	20	13	....	....	....	1,244	..	Scales 63 69	..	....	15	..	..	..	..	..	..	....	15	..
65	31	10	1	...	...	1,059	..	" 17 17	..	...	107	..	..	..	..	..	..	....	107	....
122	51	23	1	....	....	2,466	....	166	....	....	151	..	..	..	..	..	..	....	151	....
43	14	6	1	2	....	648	....	Scales 13	....	....	1	..	..	..	..	..	..	....	1	....
79	48	35	11	7	6	1,430	...	1	....	....	178	..	..	..	..	..	..	....	178	....
18	15	8	4	5	....	260	....	Scales 2	....	....	113	2	..	..	..	..	..	....	115	....
97	63	43	15	12	6	1,690	....	3	....	....	291	2	..	..	..	..	..	...	293	....
38	3	...	....	..	....	560	....	Scales 7	....	...	......	..	..	..	..	.	..	...	....	...

E. MIALL,

Commissioner.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of
Year ended

Inspection Divisions.	Dominion Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Hamilton	....	....	....	....	....	...	4	2	7	14	16	11	10	11
Ottawa	....	...	....	....	....	....	20	28	26	16	9	10	.....	......
Totals	....	....	.	...	....	...	24	30	33	30	25	21	10	11
Quebec.														
Montreal	....	....	....	...	....	2	25	35	47	96	91	88	69	50
Quebec	....	....	....	....	....	....	...	3	..	6	5	4	1	....
Three Rivers	....	....	....	..	...	....	......	....	.....	......	.. .	.....	....	. .
Totals	....	...	....	....	..	2	25	38	47	102	96	92	70	50
Nova Scotia.														
Cape Breton	....	....	....	...	....	....	... .	......	......	.....	......	......	.....	....
Pictou	....	....	....	....	...	....	......	...	.. ...	......	...	......	......	1
Totals	....	....	....	....	.. .	....	......	...	.....	....	......	. . .	......	1

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

C—*Concluded.*

each Denomination, Rejected in each Inspection Division during the Fiscal June 30, 1900.

Weights.									Lineal Measures.											
dupois.							Troy Weights.	Miscellaneous Weights.												Miscellaneous Measures.
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.			6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	
5	....	1	....	....	....	81	....	....	....	....	84	..	..	..	..	..	..	....	84	....
....	....	....	....	....	....	109	....	Scales 211	....	....	2	..	..	..	..	..	..	....	2	....
5	....	1	....	....	....	190	....	211	....	....	86	..	..	..	..	..	..	....	86	....
20	3	1	....	....	....	527	..	Scales 5 1	..	....	21	..	..	..	..	..	..	....	21	....
....	1	....	....	....	....	20	....	1	....	....	3	..	..	..	..	..	..	....	3	....
....	....	....	....	....	....	....	....	....	....	....	23	..	..	..	..	..	..	....	23	....
20	4	1	....	....	....	547	....	7	....	....	47	..	..	..	..	..	..	....	47	....
....	....	....	....	....	....	....	....	....	....	..	1	..	..	..	..	..	..	....	1	....
2	....	....	....	....	....	3	....	....	....	....	....	..	..	..	..	..	..	....	....	....
2	....	....	....	....	....	3	....	....	....	....	1	..	..	..	..	..	..	....	1	..

E. MIALL,
Commissioner

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Inspection Division, during the Fiscal

Inspection Divisions.	Measures of Capacity. — Dominion.											
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.
Ontario.												
Belleville	139	727	418	939	1,147	1,732	1,243	125	7	1	6,478	4
Hamilton	61	60	258	629	1,016	1,503	1,160	264	1	...	4,952	8
Ottawa	...	....	33	316	585	671	470	75	8	3	2,161	2
Toronto	33	28	146	1,806	2,756	2,792	3,316	379	16	...	11,272	156
Windsor	582	557	556	2,036	2,179	3,901	2,493	44	....	....	12,348	...
Totals	815	1,372	1,411	5,726	7,683	10,599	8,682	887	32	4	37,211	170
Quebec.												
Montreal	....	728	1,008	2,997	4,979	5,332	5,432	2,474	598	11	23,559	312
Quebec	....	195	204	964	1,538	1,444	1,060	460	78	....	5,943	....
Three Rivers	....	102	69	447	740	784	569	306	78	....	3,095	..
Totals	...	1,025	1,281	4,408	7,257	7,560	7,061	3,240	754	11	32,597	312
New Brunswick.												
St. John	....	241	195	946	1,483	1,144	704	302	40	....	5,055	10
Nova Scotia.												
Cape Breton	....	1	1	9	30	23	3	2	...	...	69	....
Halifax	1	67	93	238	249	291	197	90	37	1	1,264	91
Pictou	1	34	29	182	400	283	94	65	2	..	1,090	14
Totals	2	102	123	429	679	597	294	157	39	1	2,423	105
Prince Edward Island.												
Charlottetown	....	1	...	14	41	111	68	12	2	....	249	....
Manitoba.												
Winnipeg	72	2	....	338	560	556	366	76	....	....	1,970	62
Calgary	7	....	1	81	118	108	70	30	....	....	415	2
Totals	79	2	1	419	678	664	436	106	....	....	2,385	64
British Columbia.												
Victoria	...	....	...	24	3	61	59	3	....	....	150	....

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

D.

Weighing Machines of each Denomination presented for Verification, in each Year ended June 30, 1900.

BALANCES.

With Equal Arms.				Steelyards with Divided Arms.				Weigh Bridges or Platform Scales.						
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	Totals.
156	416	......	.....	125	1	2	3	839	223	832	115	66	194	2,972
1,822	2,122	......	....	1,730	42	2	......	3,742	114	2,664	279	80	217	12,814
91	297	......	.....	17	1	.....	.....	613	232	525	54	59	72	1,961
362	590	.....	....	370	31	7	3	923	108	914	261	108	314	3,991
404	703	....	......	355	7	1	...	1,268	131	1,218	287	53	263	4,690
2,835	4,128	..	......	2,597	82	12	6	7,385	808	6,153	996	366	1,060	26,428
1,169	2,318	......	10	1,115	3	.....	14	3,026	1,268	2,546	311	206	252	12,238
126	956	3	94	94	3	......	.....	565	678	363	10	30	31	2,953
123	573	...	1	32	....	..	......	290	319	337	7	27	10	1,719
1,418	3,847	3	105	1,241	6	....	14	3,881	2,265	3,246	328	263	293	16,910
91	354	1	14	41	...	......	.....	462	214	183	12	15	39	1,426
5	26	.....	.....	6	....	......	......	44	10	3	.....	8	15	117
40	182	4	9	11	....	......	......	199	79	148	21	3	67	763
49	136	1	9	28	...	..	....	273	107	91	14	21	34	763
94	344	5	18	45	....	......	......	516	196	242	35	32	116	1,643
35	95	....	......	16	......	......	......	93	49	132	6	8	17	451
82	196	......	...	131	......	.....	......	513	40	464	346	391	211	2,374
12	33	...	......	2	......	.....	......	108	10	93	10	10	19	297
94	229	....	.....	133	.....	......	......	621	50	557	356	401	230	2,671
72	56	......	....	29	7	2	......	266	15	135	22	12	47	668

E. MIALL,

Commissioner.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Inspection Division, during the Fiscal

Inspection Divisions.	Measures of Capacity. Dominion. Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.
Ontario.												
Belleville	139	727	418	939	1,147	1,732	1,243	125	7	1	6,478	4
Hamilton	61	59	257	629	1,016	1,503	1,159	264	1	....	4,949	8
Ottawa	....	....	24	288	555	646	449	72	7	3	2,044	2
Toronto	33	28	146	1,806	2,756	2,792	3,316	379	16	....	11,272	156
Windsor	582	557	556	2,036	2,179	3,901	2,493	44	....	....	12,348	....
Totals	815	1,371	1,401	5,698	7,653	10,574	8,660	884	31	4	37,091	170
Quebec.												
Montreal	....	727	1,004	2,996	4,976	5,329	5,432	2,473	598	11	23,546	312
Quebec	....	192	203	963	1,536	1,442	1,060	460	78	....	5,934	....
Three Rivers	....	95	57	430	723	763	550	280	75	....	2,973	....
Totals	....	1,014	1,264	4,389	7,235	7,534	7,042	3,213	751	11	32,453	312
New Brunswick.												
St. John	....	241	195	946	1,483	1,144	703	302	40	....	5,054	10
Nova Scotia.												
Cape Breton	....	1	1	9	30	23	3	2	....	....	69	....
Halifax	1	67	93	238	249	291	197	90	37	1	1,264	91
Pictou	1	34	29	182	400	283	94	65	2	....	1,090	14
Totals	2	102	123	429	679	597	294	157	39	1	2,423	105
Prince Edward Island.												
Charlottetown	....	1	....	14	41	111	68	12	2	....	249	...
Manitoba.												
Winnipeg	72	2	....	338	560	556	366	76	....	....	1,970	62
Calgary	7	....	1	81	118	108	70	30	....	....	415	2
Totals	79	2	1	419	678	664	436	106	....	....	2,385	64
British Columbia.												
Victoria	...	....	....	24	3	61	59	3	..	....	150	....

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

D—*Continued.*

Weighing Machines of each Denomination Inspected and Verified, in each Year ended June 30, 1900.

Balances.

With Equal Arms.				Steelyards with Divided Arms.				Weigh Bridges or Platform Scales.						
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	Totals.
156	416	......	......	125	1	2	3	839	223	832	115	66	194	2,972
1,804	2,015	......	......	1,669	42	2	......	3,579	89	2,438	228	69	137	12,072
69	266	......	....	14	1	....	......	575	209	493	45	50	62	1,784
362	590	......	....	370	31	7	3	923	108	914	261	108	314	3,991
401	701	....	....	355	7	1	......	1,259	130	1,209	286	53	261	4,663
2,792	3,988	..	....	2,533	82	12	6	7,175	759	5,886	935	346	968	25,482
1,149	2,215	...	9	1,050	3	....	14	2,985	1,215	2,456	301	190	244	11,831
125	956	3	93	94	3	....	...	562	678	362	10	30	31	2,947
116	542	......	1	32	......	.....	....	286	312	325	7	26	9	1,656
1,390	3,713	3	103	1,176	6	......	14	3,833	2,205	3,143	318	246	284	16,434
90	354	1	14	41	.....	......	...	461	213	182	11	15	39	1,421
5	26	..	....	6	...	......	......	44	8	3	......	8	15	115
40	180	4	9	11	......	.....	.....	199	78	142	19	3	60	745
49	136	1	9	28	......	....	...	273	107	91	14	21	34	763
94	342	5	18	45	......	.....	......	516	193	236	33	32	109	1,623
35	95	....	......	16	......	.....	......	93	49	132	6	8	17	451
80	193	....	......	120	....	......	......	495	37	435	345	388	206	2,299
12	33	......	.....	2	....	......	......	106	10	92	10	10	19	294
92	226	.	......	122	......	.....	......	601	47	527	355	398	225	2,593
72	56	......	......	29	7	2	......	266	15	135	22	12	47	663

E. MIALL,
Commissioner.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and during the Fiscal Year

INSPECTION DIVISIONS.	Measures of Capacity.											
	Dominion.											
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.
Ontario.												
Hamilton	....	1	1	.. ..	.... .	...	1	....	....	....	3	....
Ottawa	.....	.....	9	28	30	25	21	3	1	....	117	....
Windsor	.....	.. ..	......	.....	.. .	......	....	.....	....	....	....	....
Totals	.....	1	10	28	30	25	22	3	1	....	120	...
Quebec.												
Montreal	... ..	1	4	1	3	3	. .	1	....	....	13	....
Quebec	......	3	1	1	2	2	....	......	....	....	9	....
Three Rivers	. ....	7	12	17	17	21	19	26	3	....	122	....
Totals	... .	11	17	19	22	26	19	27	3	....	144	...
New Brunswick.												
St. John	... ..	......	......	.....	......	... .	1	....	....	....	1	....
Nova Scotia.												
Cape Breton	.....	......	......	......	.....		.... .	....	....	....	....	....
Halifax	......	.....	. ..	.....	....	......	.....	......	...	....	....	....
Totals	...	......	......	. .	....	......	....	..	....	....	....	....
Manitoba.												
Winnipeg	.....	.....	. . .	......	....	....	....	....	....	....	....	....
Calgary	... .	......	.....	....	......	......	.. ...	.....	....	...	....	...
Totals	...	.. ..	.. ..	... .	...	...	......	....	...	....	....	....

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

D—*Concluded.*

Weighing Machines of each Denomination Rejected, in each Inspection Division, ended June 30, 1900.

BALANCES.

With Equal Arms.				Steelyards with Divided Arms.				Weigh Bridges or Platform Scales.						
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	Totals.
18	107	....	...	61	....	....	...	163	25	226	51	11	80	742
22	31	....	...	3	....	....	...	38	23	32	9	9	10	177
3	2	....	....	....	....	....	....	9	1	9	1	....	2	27
43	140	....	....	64	....	.	....	210	49	267	61	20	92	946
20	103	....	1	65	....	..	....	41	53	90	10	16	8	407
1	...	....	1	....	....	....	....	3	....	1	....	....	....	6
7	31	....	...	....	....	....	..	4	7	12	....	1	1	63
28	134	....	2	65	....	...	....	48	60	103	10	17	9	476
1	....	....	...	....	....	....	....	1	1	1	1	....	...	4
....	....	....	....	....	....	....	....	...	2	....	..	.	...	2
....	2	....	....	....	....	....	....	....	1	6	2	....	7	18
....	2	....	....	...	....	....	....	...	3	6	2	..	7	20
2	3	....	....	11	...	....	....	18	3	29	1	3	5	75
....	....	....	....	....	....	....	....	2	....	1	...	....	....	3
2	3	....	....	11	...	....	....	20	3	30	1	3	5	78

E. MIALL,
Commissioner.

APPENDIX E.

STATEMENT of Gas Inspection Expenditures and Revenues for the year ended June 30, 1900.

Districts.	Inspectors and Officers.	Expenditures. Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Totals.	Revenues.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Barrie	Shanacy, M.	100 00				1 25	101 25	79 25
Belleville	Johnson, Wm. McRae, W. D.	349 96		165 00	3 90	66 53	585 39	236 00
Berlin	Lynes, K.	16 66			29 70	13 89	60 25	141 50
Brockville	Johnson, C. W.		99 96			9 75	109 71	175 75
Cobourg	Bickle, J. W.	100 00			19 60	21 70	141 30	140 00
Cornwall	Mulhern, M. M.	100 00				44 40	144 40	42 50
Guelph	Broadfoot, S.	100 00				12 38	112 38	241 25
Hamilton	McPhie, D. Dennis, W. A.	1,899 96		36 00	141 50	81 95	2,159 41	2,751 00
Kingston	Behan, J. J.	400 00		67 50		78 72	546 22	345 25
Listowel	Male, Thos	100 00		60 00		12 00	172 00	29 75
London	Nash, A. F.	803 74	125 23	110 00	400 14	67 30	1,506 41	2,287 25
Napanee	Johnson, W., acting				21 35	0 80	22 15	61 75
Ottawa	Roche, H. J	1,000 00	540 00	300 00		67 08	1,907 08	734 75
Owen Sound	Graham, W. J	200 00		125 00		0 50	325 50	59 00
Peterborough	Cahill, T.	183 26				4 25	187 51	126 25
Sarnia	Hicks, W. H.			20 00		1 60	21 60	130 00
Stratford	Rennie, Geo	200 00				14 95	214 95	185 50
Toronto	Johnstone, J. K. Pape, J.	2,399 92			2 00	56 15	2,458 07	5,925 75
	Ontario	7,953 50	765 19	883 50	618 19	555 20	10,775 58	13,692 50
Montreal	Aubin, A. O'Flaherty, M. J.	2,199 84	356 00	240 00	16 25	137 43	2,949 52	5,115 00
Quebec	LeVasseur, N Moreau, A.	1,300 00		150 00		49 35	1,499 35	280 25
Sherbrooke	Simpson, A. F.	100 00					100 00	38 00
	Quebec	3,599 84	356 00	390 00	16 25	186 78	4,548 87	5,433 25
Fredericton	Fowler, J. D.	200 00					200 00	57 50
St. John	Rowan, A. Wilson, J. E.	763 85			45 70	25 51	835 06	263 75
	New Brunswick	963 85			45 70	25 51	1,035 06	321 25
Halifax	Miller, A. Munro, H. D. Ritchie, A. T.	1,375 90	49 08	225 00	392 95	88 70	2,131 63	553 00
Charlottetown	Brace, R. K. Davy, E	116 62				36 71	153 33	66 00
Winnipeg	Magness, R.	200 00		108 00		42 02	350 02	495 75
Nanaimo	McAloney, J.	100 00					100 00	36 00
New Westminster	Wolfenden, Wm	100 00					100 00	
Vancouver	Miller, J. E.	300 00				59 60	359 60	286 25
Victoria	Jones, R.	200 00				13 80	213 80	222 75
	British Columbia	700 00				73 40	773 40	545 00

APPENDIX E—*Concluded.*

STATEMENT of Gas Inspection Expenditures and Revenues, &c.—*Concluded.*

RECAPITULATION.

—	Expenditures.						Revenues.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Totals.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	7,953 50	765 19	883 50	618 19	555 20	10,775 58	13,692 50
Quebec	3,599 84	356 00	390 00	16 25	186 78	4,548 87	5,433 25
New Brunswick	963 85	....	....	45 70	25 51	1,035 06	321 25
Nova Scotia	1,375 90	49 08	225 00	392 95	88 70	2,131 63	553 00
Prince Edward Island	116 62	....	....	....	36 71	153 33	66 00
Manitoba	200 00	....	108 00	....	42 02	350 02	495 75
British Columbia	700 00	....	....	....	73 40	773 40	545 00
General	....	....	....	30 70	1,204 68	1,235 38	
General expenses	....	....	....	....	1,189 43	1,189 43	
Printing	....	....	....	....	394 80	394 80	
Stationery	....	....	....	....	115 22	115 22	
Lithographing	....	....	....	....	85 00	85 00	
Totals	14,909 71	1,170 27	1,606 50	1,103 79	3,997 45	22,787 72	21,106 75

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power. Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Sulphur per 100 Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Barrie—									
July	....	....	19·03	....	0	1	....	....	....
August	....	....	19·89	....	0	1	....	....	....
September	....	....	19·38	....	0	1	....	....	....
October	....	....	19·99	....	0	1	....	....	....
November	....	....	19·16	....	0	1	....	....	....
December	....	....	21·66	....	0	1	....	....	....
January	....	....	18·73	....	0	1	....	....	....
February	....	....	21·81	....	0	1	....	....	....
March	....	....	19·26	....	0	1	....	....	....
April	....	....	20·75	....	0	1	....	....	....
May	....	....	21·92	....	0	1	....	....	....
June	....	....	19·79	....	0	1	....	....	....
					0	12			
Belleville—									
July	21·32	20·57	20·84	....	0	3	....	....	....
August	22·33	19·79	20·81	....	0	3	....	....	....
September	20·58	17·41	19·45	....	0	3	....	....	....
October	21·20	17·85	19·52	....	0	2	....	....	....
November	20·74	19·40	20·07	....	0	2	....	....	....
December	20·31	18·59	19·27	....	0	3	....	....	....
January	21·60	18·88	20·47	....	0	4	....	....	....
February	19·06	18·67	18·86	....	0	3	....	....	....
March	20·31	20·25	20·28	....	0	2	....	....	....
April	20·97	19·03	20·13	....	0	3	....	....	....
May	22·50	21·18	21·84	....	0	2	....	....	....
June	21·23	19·27	20·25	....	0	2	....	....	....
					0	32			
Berlin—									
July	....	....	17·88	....	0	1	....	....	....
August	....	....	18·71	....	0	1	....	....	....
September	....	....	17·49	....	0	1	....	....	....
October	....	....	17·40	....	0	1	....	....	....
November	....	....	17·61	....	0	1	....	....	....
December	....	....	17·29	....	0	1	....	....	....
January	....	....	17·23	....	0	1	....	....	....
February	....	....	16·97	....	0	1	....	....	....
March	....	....	17·15	....	0	1	....	....	....
April	....	....	16·72	....	0	1	....	....	....
May	....	....	17·52	....	0	1	....	....	....
June	....	....	18·82	....	0	1	....	....	....
					0	12			

F.

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
....	....		....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
		....							12	0	12	
....	....		....	....	....	....	....	..	3	0	3	
....	....	..	....	....	....	....	....	..	3	0	3	
....	....	....	....	....	....	....	....	..	3	0	3	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	3	0	3	
....	....	....	....	....	....	....	....	..	4	0	4	
....	....	....	....	....	....	....	....	..	3	0	3	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	3	0	3	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
		....							32	0	32	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Brantford—									
July	....	....	20·80	....	0	1	....	....	....
August	....	....	20·50	....	0	1	....	....	....
September	....	....	21·15	....	0	1	....	....	....
October	....	....	20·15	....	0	1	....	....	....
November	....	....	21·32	....	0	1	....	....	....
December	....	....	20·80	....	0	1	....	....	....
January	....	....	19·87	....	0	1	....	....	....
February	....	....	20·10	....	0	1	....	....	....
March	....	....	21·34	....	0	1	....	....	....
April	....	....	21·15	....	0	1	....	....	....
May	....	....	20·05	....	0	1	....	....	....
June	....	....	21·24	....	0	1	....	....	....
					0	12			
Brockville—									
July	....	....	20·02	....	0	1	....	....	....
August	....	....	18·59	....	0	1	....	....	....
September	....	....	22·55	....	0	1	....	....	....
October	....	....	20·00	....	0	1	....	....	....
November	....	....	19·80	....	0	1	....	....	....
December	....	....	17·67	....	0	1	....	....	....
January	....	....	20·00	....	0	1	....	....	....
February	....	....	20·00	....	0	1	....	....	....
March	....	....	19·96	....	0	1	....	....	....
April	....	....	20·00	....	0	1	....	....	....
May	....	....	19·90	....	0	1	....	....	....
June	....	....	20·00	....	0	1	....	....	....
					0	12			
Chatham—									
July	....	....	....	....	....	....	....	....	....
August	....	....	....	....	....	....	....	....	....
September	....	....	....	....	....	....	....	....	....
October	....	....	....	....	....	....	....	....	....
November	....	....	16·72	....	0	1	....	....	....
December	....	....	....	....	....	....	....	....	....
January	....	....	....	....	....	....	....	....	....
February	....	....	16·89	....	0	1	....	....	....
March	....	....	16·27	....	0	1	....	....	....
April	....	....	16·09	....	0	1	....	....	....
May	....	....	16·02	....	0	1	....	....	....
June	....	....	16 33	....	0	1	....	....	....
					0	6			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									12	0	12	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									12	0	12	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									6	0	6	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Cobourg—									
July			19·34		0	1			
August			19·70		0	1			
September			16·70		0	1			
October			17·47		0	1			
November			17·03		0	1			
December			18·09		0	1			
January			17·01		0	1			
February			17·94		0	1			
March			17·43		0	1			
April			17·32		0	1			
May			19·48		0	1			
June			18·58		0	1			
					0	12			
Cornwall—									
July			18·10		0	1			
August			18·30		0	1			
September			18·10		0	1			
October			17·32		0	1			
November			18·70		0	1			
December			18·10		0	1			
January			18·30		0	1			
February			18·70		0	1			
March			18·10		0	1			
April			18·10		0	1			
May			18·10		0	1			
June			18·80		0	1			
					0	12			
Deseronto—									
July	22·10	21·00	21·55		0	2			
August	19·40	18·20	18·80		0	2			
September			22·20		0	1			
October			24·40		0	1			
November			24·40		0	1			
December			21·90		0	1			
January			22·70		0	1			
February			25·40		0	1			
March			19·80		0	1			
April			24·90		0	1			
May			24·10		0	1			
June			20·70		0	1			
					0	14			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	1	1	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
									23	1	24	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
									12	0	12	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	2	0	2	
....	....	....	....	....	....	....	....	..	0	1	1	
....	....	....	....	....	....	....	....	..	0	1	1	
....	....	....	....	....	....	....	....	..	0	1	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
									11	3	14	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power. Highest. Candles.	Lowest. Candles.	Average. Candles.	Standard. 16 Candles.	No. of times below Standard.	No. of Tests.	Sulphur per 100 Highest Grains.	Lowest. Grains.	Average Grains.
Dundas—									
July	......	......	19·34	......	0	1	......	......	......
August	......	......	20·80	......	0	1	......	......	......
September	......	......	19·28	......	0	1	......	......	......
October	......	......	19·28	......	0	1	......	......	......
November	......	......	20·31	......	0	1	......	......	......
December	......	......	19·50	......	0	1	......	......	......
January	......	......	19·66	......	0	1	......	......	......
February	......	......	20·20	......	0	1	......	......	......
March	......	......	19·96	......	0	1	......	......	......
April	......	......	20·08	......	0	1	......	......	......
May	......	......	19·28	......	0	1	......	......	......
June	......	......	19·65	......	0	1	......	......	......
					0	12			
Galt—									
July	......	......	20·40	......	0	1	......	......	......
August	......	......	19·02	......	0	1	......	......	......
September	......	......	18·00	......	0	1	......	......	......
October	......	......	18·69	......	0	1	......	......	......
November	......	......	20·40	......	0	1	......	......	......
December	......	......	21·02	......	0	1	......	......	......
January	......	......	20·02	......	0	1	......	......	......
February	......	......	18·40	......	0	1	......	......	......
March	......	......	18·32	......	0	1	......	......	......
April	......	......	19·62	......	0	1	......	......	......
May	......	......	20·10	......	0	1	......	......	......
June	......	......	19·00	......	0	1	......	......	......
					0	12			
Guelph—									
July	......	......	20·30	......	0	1	......	......	......
August	......	......	21·79	......	0	1	......	......	......
September	......	......	21·29	......	0	1	......	......	......
October	......	......	21·01	......	0	1	......	......	......
November	......	......	20·52	......	0	1	......	......	......
December	......	......	21·63	......	0	1	......	......	......
January	......	......	20·88	......	0	1	......	......	......
February	......	......	18·31	......	0	1	......	......	......
March	......	......	18·30	......	0	1	......	......	......
April	......	......	18·26	......	0	1	......	......	......
May	......	......	18·90	......	0	1	......	......	......
June	......	......	19·48	......	0	1	......	......	......
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
									12	0	12	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
									12	0	12	
....	......	....	....	....	....	....	.....	..	2	0	2	
....	......	....	....	....	....	....	.....	..	2	0	2	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
....	......	....	....	....	....	....	.....	..	1	0	1	
									14	0	14	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Hamilton—									
July	...	...	17·97	...	0	1	...	...	...
August	...	...	18·00	...	0	1	...	...	...
September	18·19	17·79	17·99	...	0	2	...	...	...
October	18·65	18·14	18·39	...	0	2	...	...	...
November	18·29	18·06	18·17	...	0	2	...	...	...
December	18·14	17·00	17·57	...	0	2	...	...	...
January	...	...	18·21	...	0	1	...	...	...
February	...	...	17·85	...	0	1	...	...	...
March	...	...	18·21	...	0	1	...	...	...
April	...	...	17·85	...	0	1	...	...	...
May	...	...	18·21	...	0	1	...	...	...
June	...	...	17·50	...	0	1	...	...	...
					0	16			
Ingersoll—									
July	...	...	...	...	...	...	...	...	...
August	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...
December	...	...	16·71	...	0	1	...	...	...
January	...	...	20·68	...	0	1	...	...	...
February	...	...	17·38	...	0	1	...	...	...
March	...	...	17·76	...	0	1	...	...	...
April	...	...	16·71	...	0	1	...	...	...
May	...	...	19·66	...	0	1	...	...	...
June	...	...	18·30	...	0	1	...	...	...
					0	7			
Kingston—									
July	20·42	20·20	20·30	...	0	3	...	...	...
August	19·40	19·20	19·30	...	0	2	...	...	...
September	19·06	18·14	18·53	...	0	3	...	...	...
October	20·20	19·40	19·80	...	0	2	...	...	...
November	21·12	19·20	20·41	...	0	4	...	...	...
December	23·80	21·78	22·87	...	0	3	...	...	...
January	22·60	22·40	22·50	...	0	2	...	...	...
February	...	...	21·62	...	0	1	...	...	...
March	21·40	21·20	21·30	...	0	2	...	...	...
April	22 00	20·93	21·46	...	0	2	...	...	...
May	21·40	19·30	20·35	...	0	2	...	...	...
June	22·87	22·90	22·84	...	0	2	...	...	...
					0	28			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
									16	0	16	
...	...	...	...	...	...	...	...	..	...	...	...	
...	...	...	...	...	...	...	...	..	...	...	...	
...	...	...	...	...	...	...	...	..	...	...	...	
...	...	...	...	...	...	...	...	..	...	...	...	
...	...	...	...	...	...	...	...	..	...	...	...	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
									7	0	7	
...	...	...	...	...	...	...	...	..	3	0	3	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	3	0	3	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	4	0	4	
...	...	...	...	...	...	...	...	..	3	0	3	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	2	0	2	
...	...	...	...	...	...	...	...	..	2	0	2	
									28	0	28	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below standard.	No. of Tests.	Highest	Lowest	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Listowel—									
July			20·00		0	1			
August			21·24		0	1			
September			20·88		0	1			
October			20·09		0	1			
November			19·12		0	1			
December			21·08		0	1			
January			22·31		0	1			
February			22·31		0	1			
March			21·10						
April					0	1			
May			21·66						
June					0	1			
					0	10			
London—									
July									
August									
September									
October									
November									
December	17·56	16·69	17·14		0	3			
January	19·50	17·24	18·31		0	3			
February	18·08	16·92	17·50		0	2			
March			17·90		0	1			
April			16·70		0	1			
May	20·00	18·50	19·25		0	2			
June			18·44		0	1			
					0	13			
Napanee—									
July			21·67		0	1			
August			19·40		0	1			
September			21·82		0	1			
October									
November			21·42		0	1			
December			21·60		0	1			
January			21·94		0	1			
February			21·90		0	1			
March			23·23		0	1			
April			21·50		0	1			
May			21·93		0	1			
June			21·51		0	1			
					0	11			

SESSIONAL PAPER No. 13

F—*Continued*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
									10	0	10	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	1	0	1	
...		...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
									14	0	14	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									11	0	11	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power. Highest. Candles.	Lowest. Candles.	Average. Candles.	Standard. 16 Candles.	No. of times below standard.	No. of Tests.	Sulphur per 100 Highest Grains.	Lowest. Grains.	Average Grains.
Ottawa—									
July	21·82	21·00	21·41	....	0	2	14·92	14·75	14·88
August	21·91	21·53	21·72	....	0	2	15·32	14·97	15·14
September	21·88	21·83	21·85	....	0	2	15·37	14·77	15·07
October	21·89	21·22	21·55	....	0	2	14·86	14·48	14·67
November	22·09	21·47	21·78	....	0	2	14·59	14·29	14·44
December	21·64	21·38	21·51	....	0	2	15·03	14·36	14·69
January	21·99	21·80	21·89	....	0	2	14·80	14·20	14·50
February	21·61	21·52	21·56	....	0	2	15·22	14·52	14·87
March	22·22	21·80	22·01	....	0	2	14·80	14·25	14·52
April	21·62	21·55	21·58	....	0	2	14·41	14·21	14·31
May	22·22	21·80	22·01	....	0	2	14·92	14·47	14·69
June	22·12	21·00	21·76	....	0	2	14·41	14·03	14·22
					0	24			
Owen Sound—									
July	....	....	20·22	....	0	1	....	....	....
August	....	....	21·80	....	0	1	....	....	....
September	....	....	22·23	....	0	1	....	....	....
October	....	....	22·20	....	0	1	....	....	....
November	....	....	22·23	....	0	1	....	....	....
December	....	....	22·22	....	0	1	....	....	....
January	....	....	21·60	....	0	1	....	....	....
February	....	....	22·41	....	0	1	....	....	....
March	....	....	21·75	....	0	1	....	....	....
April	....	....	22·15	....	0	1	....	....	....
May	....	....	22·14	....	0	1	....	....	....
June	....	....	22·70	....	0	1	....	....	....
					0	12			
Peterborough—									
July	....	....	19·90	....	0	1	....	....	....
August	....	....	21·33	....	0	1	....	....	....
September	....	....	21·62	....	0	1	....	....	....
October	....	....	23·28	....	0	1	....	....	....
November	....	....	22·80	....	0	1	....	....	....
December	....	....	19·46	....	0	1	....	....	....
January	....	....	21·75	....	0	1	....	....	....
February	....	....	19·48	....	0	1	....	....	....
March	....	....	21·46	....	0	1	....	....	....
April	....	....	21·60	....	0	1	....	....	....
May	....	....	....	....	....	....	....	....	....
June	....	....	....	....	....	....	....	....	....
					0	10			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
...	0	2	...	...	...	...	...	..	2	0	2	
	0	24							24	0	24	
...	..	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
									12	0	12	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	1	0	1	
...	...	...	...	...	...	...	...	..	...	...	...	
...	...	...	...	...	...	...	...	..	...	...	...	
									10	0	10	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power. Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Sulphur per 100 Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Port Hope—									
July	....	....	17·22	....	0	1	....	....	....
August	....	....	16·81	....	0	1	....	....	....
September	....	....	16·72	....	0	1	....	....	....
October	....	....	17·45	....	0	1	....	....	....
November	....	....	17·41	....	0	1	....	....	....
December	....	....	18·39	....	0	1	....	....	....
January	....	....	17·29	....	0	1	....	....	....
February	....	....	17·63	....	0	1	....	....	....
March	....	....	17·12	....	0	1	....	....	....
April	....	....	18·60	....	0	1	....	....	....
May	....	....	18·42	....	0	1	....	....	....
June	....	....	18·37	....	0	1	....	....	....
					0	12			
Sarnia—									
July	....	....	20·36	....	0	1	....	....	....
August	....	....	....	....	..	....	....	....	....
September	....	....	20·14	....	0	1	....	....	....
October	....	....	21·47	....	0	1	....	....	....
November	....	....	21·03	....	0	1	....	....	....
December	....	....	20·23	....	0	1	....	....	....
January	....	....	20·37	....	0	1	....	....	....
February	....	....	20·54	....	0	1	....	....	....
March	....	....	20·62	....	0	1	....	....	....
April	....	....	21·75	....	0	1	....	....	....
May	....	....	20·29	....	0	1	....	....	....
June	....	....	19·98	....	0	1	....	....	....
					0	11			
Stratford—									
July	....	....	18·22	....	0	1	....	....	....
August	....	....	17·34	....	0	1	....	....	....
September	....	....	16·80	....	0	1	....	....	....
October	....	....	17·69	....	0	1	....	....	....
November	....	....	17·24	....	0	1	....	....	....
December	....	....	16·75	....	0	1	....	....	....
January	....	....	17·13	....	0	1	....	....	....
February	....	....	17·07	....	0	1	....	....	....
March	....	....	16·38	....	0	1	....	....	....
April	....	....	16·67	....	0	1	....	....	....
May	....	....	16·67	....	0	1	....	....	....
June	....	....	17·32	....	0	1	....	....	....
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
									24	0	24	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									11	0	11	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
	12	0							12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power. Highest. Candles.	Lowest. Candles.	Average. Candles.	Standard. 16 Candles.	No. of times below Standard.	No. of Tests.	Sulphur per 100 Highest Grains.	Lowest. Grains.	Average Grains.
St. Catharines—									
July	....	....	19·12	....	0	1	....	....	....
August	....	....	19.66	....	0	1	....	....	....
September	....	....	19·50	....	0	1	....	....	....
October	....	....	20·40	....	0	1	....	....	....
November	....	....	21·39	....	0	1	....	....	....
December	....	....	19 34	....	0	1	....	....	....
January	....	....	20·90	....	0	1	....	....	....
February	....	....	20·18	....	0	1	....	....	....
March	....	....	20·57	....	0	1	....	....	....
April	....	....	20·00	....	0	1	....	....	....
May	....	....	20·55	....	0	1	....	....	....
June	....	....	20·21	....	0	1	....	....	....
					0	12			
St. Thomas—									
July	....	....	....	....	....	....	....	....	....
August	....	....	....	....	....	....	....	....	....
September	....	....	....	....	....	....	....	....	....
October	....	....	....	....	....	....	....	....	....
November	....	....	....	....	....	....	....	....	....
December	....	....	....	....	....	....	....	....	....
January	....	....	19·54	....	0	1	....	....	....
February	....	....	17·74	....	0	1	....	....	....
March	....	....	20·13	....	0	1	....	....	....
April	....	....	16·58	....	0	1	....	....	....
May	....	....	16·74	....	0	1	....	....	....
June	....	....	16·04	....	0	1	....	....	....
					0	6			
Toronto—									
July	20 54	19·35	20·24	....	0	8	11·74	9·90	10·82
August	19·83	19·29	19·60	....	0	9	9·98	8·35	9·16
September	20·41	19·14	19·68	....	0	9	13·88	10·39	11·63
October	20·57	19·09	19·63	....	0	8	13·94	10·35	12·16
November	20·25	19·01	19·70	....	0	9	9·79	8·26	9·02
December	20·44	19·54	20·10	....	0	9	13·88	12·45	13·06
January	21·00	19·66	20·14	....	0	8	15·22	11·13	13·17
February	20·02	18·99	19·57	....	0	9	15·06	9·94	12·50
March	20·40	18 14	19·28	....	0	9	17·93	17·20	17·56
April	19·50	18 71	19·03	....	0	8	19·64	18·21	18·92
May	20·91	19·16	19·88	....	0	9	18·21	17·39	17·80
June	20·87	19·58	20·20	....	0	9	16·88	12·60	14·74
					0	104			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									12	0	12	
...		...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									6	0	6	
...	0	2	1·13	0·92	1·02	...	0	2	8	0	8	
...	0	2	0·82	0·67	0·74	...	0	2	9	0	9	
...	0	2	1·15	1·01	1·08	...	0	2	9	0	9	
...	0	2	0·76	...	0·38	...	0	2	8	0	8	
...	0	2	0·81	0·76	0·78	...	0	2	9	0	9	
...	0	2	1·21	1·11	1·16	...	0	2	9	0	9	
...	0	2	1·03	0·75	0·89	...	0	2	8	0	8	
...	0	2	0·11	0·05	0·08	...	0	2	9	0	9	
...	0	2	1·30	1·25	1·27	...	0	2	9	0	9	
...	0	2	1·27	1·12	1·19	...	0	2	8	0	8	
...	0	2	1·12	0·96	1·04	...	0	2	9	0	9	
...	0	2	1·28	0·20	0 74	...	0	2	9	0	9	
	0	24					0	24	104	0	104	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Windsor—									
July	...	...	...	...	...	...	...	...	...
August	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...
November	...	...	16·25	...	0	1	...	...	...
December	...	...	16·66	...	0	1	...	...	...
January	17·66	14·21	15·93	...	1	2	...	...	...
February	...	...	16·40	...	0	1	...	...	...
March	...	...	16·27	...	0	1	...	...	...
April	...	...	16·30	...	0	1	...	...	...
May	...	...	16·26	...	0	1	...	...	...
June	...	...	16·60	...	0	1	...	...	...
					1	9			
Woodstock—									
July	...	...	...	...	...	...	...	...	...
August	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...
November	...	...	27·75	...	0	1	...	...	...
December	...	...	22·98	...	0	1	...	...	...
January	...	...	26·31	...	0	1	...	...	...
February	...	...	31·30	...	0	1	...	...	...
March	...	...	21·12	...	0	1	...	...	...
April	...	...	24·13	...	0	1	...	...	...
May	...	...	25·96	...	0	1	...	...	...
June	...	...	25·78	...	0	1	...	...	...
					0	8			
Montreal—									
July	21·87	17·16	19·85	...	0	8	30·82	29·68	30·25
August	20·85	18·40	19·83	...	0	9	15·79	15·50	15·64
September	19·76	17·72	18·74	...	0	9	18·22	11·64	14·93
October	19·51	18·22	18·67	...	0	8	18·09	8·54	13·31
November	19·65	18·01	18·88	...	0	9	20·64	9·79	15·21
December	18·94	18·00	18·12	...	0	9	23·27	22·48	22·87
January	18·33	17·01	17·46	...	0	9	20·52	18·61	19·56
February	18·40	16·43	17·47	...	0	8	22·03	19·89	20·96
March	18·85	16·74	17·76	...	0	9	27·93	20·65	24·29
April	19·16	17·00	17·83	...	0	8	20·82	19·82	20·32
May	19·69	17·66	18·56	...	0	9	22·43	22·22	22·32
June	21·44	18·00	20·03	...	0	9	24·09	22·23	23·16
					0	104			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									8	0	8	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									8	0	8	
...	0	2	0·20	0·00	0·10	...	0	2	11	0	11	
...	0	2	0·52	0·51	0·51	...	0	2	12	0	12	
...	0	2	...	...	...	...	0	2	12	0	12	
...	0	2	...	...	...	...	0	2	11	0	11	
...	0	2	0·25	0·00	0·12	...	0	2	12	0	12	
...	0	2	0·76	0·25	0·50	...	0	2	12	0	12	
...	0	2	...	...	...	...	0	2	12	0	12	
...	0	2	...	...	...	...	0	2	11	0	11	
...	0	2	0·35	0·00	0·17	...	0	2	13	0	13	
...	0	2	...	...	...	...	0	2	11	0	11	
...	0	2	...	...	...	...	0	2	12	0	12	
...	0	2	0·51	0·00	0·25	...	0	2	12	0	12	
	0	24					0	24	141	0	141	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Quebec—									
July	...	...	17·38	...	0	1	14·77	12·34	13·55
August	...	...	17·78	...	0	1	15·41	14·82	15·01
September	...	...	17·34	...	0	1	20·08	17·89	18·98
October	...	...	17·87	...	0	1	16·95	14·30	15·62
November	...	...	18·31	...	0	1	20·16	17·76	18·97
December	...	...	18·07	...	0	1	21·18	16·42	18·80
January	...	...	17·79	...	0	1	19·55	18·14	18·84
February	...	...	18·39	...	0	1	20·67	19·83	20·25
March	...	...	18·01	...	0	1	20·70	16·48	18·59
April	...	...	18·55	...	0	1	19·37	17·97	18·67
May	...	...	17·97	...	0	1	20·15	17·29	18·72
June	...	...	18·04	...	0	1	18·10	14·12	16·11
					0	12			
Sherbrooke—									
July	...	...	18·53	...	0	1	...	...	...
August	...	...	18·54	...	0	1	...	...	...
September	...	...	18·73	...	0	1	...	...	...
October	...	...	19·01	...	0	1	...	...	...
November	...	...	17·06	...	0	1	...	...	...
December	...	...	18·44	...	0	1	...	...	...
January	...	...	16·35	...	0	1	...	...	...
February	...	...	16·05	...	0	1	...	...	...
March	...	...	16·80	...	0	1	...	...	...
April	...	...	17·24	...	0	1	...	...	...
May	...	...	16·03	...	0	1	...	...	...
June	...	...	17·15	...	0	1	...	...	...
					0	12			
Fredericton—									
July	18·77	16·79	17·94	...	0	7	...	...	...
August	18·67	17·35	17·88	...	0	7	...	...	...
September	18·39	16·72	17·83	...	0	8	...	...	...
October	18·74	17·09	18·03	...	0	8	...	...	...
November	18·21	16·28	17·43	...	0	8	...	...	...
December	18·70	16·94	17·93	...	0	8	...	...	...
January	18·20	17·47	17·89	...	0	8	...	...	...
February	18·44	17·32	17·99	...	0	8	...	...	...
March	18·31	17·25	17·94	...	0	6	...	...	...
April	18·39	17·37	17·90	...	0	5	...	...	...
May	18·12	17·41	17·81	...	0	4	...	...	...
June	17·93	17·14	17·40	...	0	5	...	...	...
					0	82			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest. Grains.	Lowest. Grains.	Average. Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
	0	24					0	24	24	0	24	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									12	0	12	
...	...	...	...	...	...	...	...	...	7	0	7	
...	...	...	...	...	...	...	...	...	7	0	7	
...	...	...	...	...	...	...	...	...	8	0	8	
...	...	...	...	...	...	...	...	...	8	0	8	
...	...	...	...	...	...	...	...	...	7	1	8	
...	...	...	...	...	...	...	...	...	8	0	8	
...	...	...	...	...	...	...	...	...	8	0	8	
...	...	...	...	...	...	...	...	...	8	0	8	
...	...	...	...	...	...	...	...	...	6	0	8	
...	...	...	...	...	...	...	...	...	5	0	5	
...	...	...	...	...	...	...	...	...	4	0	4	
...	...	...	...	...	...	...	...	...	5	0	5	
									81	1	82	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power. Highest. Candles.	Lowest. Candles.	Average. Candles.	Standard. 16 Candles.	No. of times below Standard.	No. of Tests.	Sulphur per 100 Highest Grains.	Lowest. Grains.	Average Grains.
Moncton—									
July	....	....	19·47	....	0	1	....	....	....
August	....	....	20·00	....	0	1	....	....	....
September	....	....	16·34	....	0	1	....	....	....
October	....	....	18·75	....	0	1	....	....	....
November	....	....	15·87	....	1	1	....	....	....
December	....	....	15·36	....	1	1	....	....	....
January	....	....	....	....	....	....	....	....	....
February	....	....	....	....	....	....	....	....	....
March	....	....	....	....	....	....	....	....	....
April	....	....	....	....	....	....	....	....	....
May	....	....	....	....	....	....	....	....	....
June	....	....	....	....	....	....	....	....	....
					2	6			
St. John—									
July	17·63	16·35	16·89	....	0	8	20·20	16·73	18·27
August	17·75	16·04	16·98	....	0	8	22·58	18·71	20·56
September	17·82	16·10	17·12	....	0	8	20·06	18·06	19·04
October	17·96	16·03	16·96	....	0	8	23·04	18·02	19·77
November	18·25	16·41	17·11	....	0	8	20·82	16·41	19·90
December	17·81	16·66	17·10	....	0	8	24·12	17·46	21·61
January	18·79	16·59	17·46	....	0	3	23·75	23·18	23·47
February	....	....	....	....	....	....	....	....	....
March	....	....	....	....	....	....	....	....	....
April	....	....	....	....	....	....	....	....	....
May	....	....	....	....	....	....	....	....	....
June	....	....	....	....	....	....	....	....	....
					0	49			
Halifax —									
July	17·82	17·80	17·81	....	0	2	13·50	12·47	12·98
August	17·52	16·68	17·10	....	0	2	13·31	12·85	13·08
September	17·26	16·47	16·86	....	0	2	12·35	11·35	11·85
October	17·14	16·84	16·99	....	0	2	12·96	12·77	12·86
November	17·58	17·37	17·47	....	0	2	11·35	10·52	10·93
December	17·37	17·27	17·32	....	0	2	9·42	8·59	9·00
January	....	....	17·10	....	0	1	....	....	11·46
February	....	....	17·26	....	0	1	....	....	11·72
March	....	....	17·36	....	0	1	....	....	9·82
April	....	....	17·26	....	0	1	....	....	10·96
May	....	....	17·26	....	0	1	....	....	9·07
June	....	....	16·04	....	0	1	....	....	11·07
					0	18			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests	No. of times absent.	No. of times present.	No. of Tests.	Remarks.
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
									6	0	6	
...	0	4	3·93	2·25	2·84	...	0	4	8	0	8	
...	0	5	3·25	1·83	2·36	...	0	5	8	0	8	
...	0	4	2·66	2·42	2·57	...	0	4	8	0	8	
...	0	4	2·80	1·61	2·23	...	0	4	8	0	8	
...	0	3	3·90	2·60	3·22	...	0	3	6	0	6	
...	0	4	3·67	2·63	3·19	...	0	4	8	0	8	
...	0	2	3·86	3·24	3·55	...	0	2	3	0	3	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
	0	26					0	26	49	0	49	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	1	...	...	...	...	0	1	1	0	1	
...	0	1	...	...	...	...	0	1	1	0	1	
...	0	1	...	...	...	...	0	1	1	0	1	
...	0	1	...	...	...	...	0	1	1	0	1	
...	0	1	...	...	...	...	...	...	1	0	1	
...	0	1	...	...	...	...	...	...	1	0	1	
	0	18					0	16	18	0	18	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Pictou—									
July			18·55		0	1			
August			18·20		0	1			
September									
October			18·40		0	1			
November			18·15		0	1			
December			18·83		0	1			
January			18·25		0	1			
February									
March									
April			18·15		0	1			
May			18·04		0	1			
June			18·92		0	1			
					0	9			
Yarmouth—									
July			18·32		0	1			
August			17·27		0	1			
September									
October			17·97		0	1			
November			17·70		0	1			
December			17·14		0	1			
January									
February			17·60		0	1			
March									
April			17·44		0	1			
May			16·10		0	1			
June			17·32		0	1			
					0	9			
Charlottetown—									
July	17·35	16·86	17·13		0	3			
August	17·91	17·28	17·57		0	3			
September	19·50	17·83	18·57		0	3			
October	17·65	16·95	17·19		0	3			
November	18·74	18·31	18·46		0	3			
December	19 55	17·18	18·17		0	3			
January	18·76	17·97	18·39		0	3			
February									
March									
April									
May									
June	18·76	16·52	18·07		0	5			
					0	26			

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
tandard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									9	0	9	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
									9	0	9	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	1	2	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	5	0	5	
									24	2	26	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Winnipeg—									
July			20·01		0	1			
August			21·00		0	1			
September			21·01		0	1			
October			20·21		0	1			
November			19·94		0	1			
December			21·22		0	1			
January			22·40		0	1			
February			21·71		0	1			
March			19·75		0	1			
April			20·85		0	1			
May			21·34		0	1			
June			22·40		0	1			
					0	12			
Nanaimo—									
July			19·80		0	1			
August			18·63		0	1			
September			16·57		0	1			
October			17·98		0	1			
November			16·01		0	1			
December			18·42		0	1			
January			20·10		0	1			
February			19·66		0	1			
March			18·51		0	1			
April			20·53		0	1			
May			18·85		0	1			
June			19·58		0	1			
					0	12			
Vancouver—									
July			18·42		0	1			
August			18·50		0	1			
September			18·68		0	1			
October			19·04		0	1			
November			18·55		0	1			
December			18·50		0	1			
January			17·89		0	1			
February			17·06		0	1			
March			17·35		0	1			
April			18·68		0	1			
May			18·23		0	1			
June			20·96		0	1			
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest Grains.	Lowest. Grains.	Average Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
									12	0	12	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Victoria—									
July			18·07		0	1			
August			18·11		0	1			
September									
October			18·39		0	1			
November			18·44		0	1			
December			18·26		0	1			
January			18·17		0	1			
February			18·20		0	1			
March			18·24		0	1			
April			18.02		0	1			
May			18·17		0	1			
June			18·12		0	1			
					0	11			

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

SESSIONAL PAPER No. 13

F—*Concluded.*

Inspected during the Year ended June 30, 1900.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard. 35 Grains.	No. of times in excess of allowance.	No. of Tests.	Highest. Grains.	Lowest. Grains.	Average. Grains.	Standard. 4 Grains.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	....	....	1	0	1	
									11	0	11	

E. MIALL,
Commissioner.

APPENDIX G.

STATEMENT of Gas Meters presented for Verification, Verified, Verified after first Rejection and Rejected, during the Year ended June 30, 1900.

Inspection Offices.	Presented for Verification	Kind.		Verified as coming within the Error tolerated by Law.			Verified after First Rejection.			Rejected.			Totals Verified and Rejected.	
		Wet.	Dry.	Correct.	Fast.	Slow.	Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Verified.	Rejected.
Barrie	35	....	35	3	5	27							35	....
Belleville	144	....	144	44	35	45				11	1	8	124	20
Berlin	90	....	90	1	7	79					2	1	87	3
Brockville	124	....	124	42	46	36							124	....
Cobourg	74	....	74	3	29	39		1			1	1	72	2
Cornwall	6	....	6	6									6	....
Guelph	173	....	173	7	26	137					1	2	170	3
Hamilton	1,923	....	1,923	521	242	1,160							1,923	....
Kingston	270	....	270	86	39	145							270	....
Listowell	13	....	13	3	2	8							13	....
London	1,509	499	1,010	251	289	956	2		1		9	1	1,499	10
Napanee	18	....	18	6	3	7					2		16	2
Ottawa	499	....	499	11	37	443				1	4	3	491	8
Owen Sound	23	....	23	20	3								23	....
Peterborough	52	....	52	11	13	28							52	....
Sarnia	104	....	104	104									104	....
Stratford	152	....	152	37	25	70		1		2	2	15	133	19
Toronto	5,582	....	5,582	1,176	1,447	2,933				10	7	9	5,556	26
Montreal	5,080	....	5,080	727	746	3,571				2	28	6	5,044	36
Quebec	134	....	134	76	18	40							134	....
Sherbrooke	2	....	2		2								2	....
Fredericton	21	....	21	4	2	13			1			1	20	1
St. John	191	....	191	63	27	100						1	190	1
Halifax	336	233	103	210	42	84							336	....
Charlottetown	27	6	21	2	4	8		4	2	2	2	3	20	7
Winnipeg	446	....	446	50	12	384							446	....
Vancouver	215	....	215	69	39	107							215	....
Victoria	171	....	171	32	34	105							171	....
Totals	17,414	738	16,676	3,565	3,174	10,525	2	6	4	28	59	51	17,276	138

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX H.

STATEMENT of Electric Light Inspection Expenditures and Revenues for the Year ended June 30, 1900.

Districts.	Inspectors.	Expenditures. Special Assistance	Expenditures. Travelling Expenses.	Expenditures. Sundries.	Expenditures. Totals.	Revenues. Registration Fees.	Revenues. Inspection Fees.	Revenues. Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Johnson, Wm.	....	132 55	2 35	134 90	485 00	436 75	921 75
Hamilton	McPhie, D.	....	40 20	....	40 20	355 00	238 00	593 00
London	Nash, A. F.	....	45 85	0 60	46 45	635 00	330 00	965 00
Ottawa	Roche, H. G.	....	....	....	....	380 00	869 75	1,249 75
Toronto	Johnstone, J. K.	....	143 70	2 70	146 40	890 00	1,278 50	2,168 50
	Totals	....	362 30	5 65	367 95	2,745 00	3,153 00	5,898 00
Montreal	Aubin, A.	374 00	19 70	9 03	402 73	275 00	3,180 50	3,455 50
Quebec	LeVasseur, N.	....	....	19 56	19 56	97 50	535 25	632 75
Sherbrooke	Simpson, A. F.	....	90 95	2 35	93 30	345 00	207 50	552 50
	Totals	374 00	110 65	30 94	515 59	717 50	3,923 25	4,640 75
St. John	Wilson, J. E.	....	69 78	3 52	73 30	200 00	283 00	483 00
Halifax	Miller, A.	....	130 00	0 75	130 75	410 00	314 00	724 00
Winnipeg	Magness, R.	....	24 00	1 95	25 95	270 00	1,179 75	1,379 75
Vancouver	Millar, J. E.	....	52 50	10 50	63 00	190 00	703 25	893 25
Victoria	Jones, R.	....	....	0 80	0 80	60 00	268 00	328 00
		....	52 50	11 30	63 80	250 00	971 25	1,221 25

RECAPITULATION.

	Salaries.	Special Assistance	Travelling Expenses	Sundries	Totals	Registration Fees	Inspection Fees	Totals
Ontario	....	....	362 30	5 65	367 95	2,745 00	3,153 00	5,898 00
Quebec	....	374 00	110 65	30 94	515 59	717 50	3,923 25	4,640 75
New Brunswick	....	....	69 78	3 52	73 30	200 00	283 00	483 00
N. Scotia and P.E.I.	....	....	130 00	0 75	130 75	410 00	314 00	724 00
Manitoba	....	....	24 00	1 95	25 95	270 00	1,179 75	1,449 75
British Columbia	....	....	52 50	11 30	63 80	250 00	971 25	1,221 25
Chief Electrical Engr	2,347 29	....	421 80	49 56	2,818 65	....	....	....
Gen. Contingencies	....	....	....	959 41	959 41	....	....	....
Printing	....	....	....	58 36	58 36	....	....	....
Stationery	....	....	....	12 57	12 57	....	....	....
Totals	2,347 29	374 00	1,171 03	1,134 01	5,026 33	4,592 50	9,824 25	14,416 75

E. MIALL
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX I.

STATEMENT showing the number of Electric Light Meters Verified, Rejected, and Verified after first Rejection, in each Inspection Division, for the fiscal year ended June 30, 1900.

Divisions.	Number presented.	Verified as coming within the Error tolerated by Law.			Rejected.			Verified after first rejection as coming within the Error Tolerated by Law.		
		Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Correct.	Fast.	Slow.
Belleville	290	214	27	49						
Hamilton	181	84	19	78						
London	279	102	103	73			1			
Ottawa	834	54	359	413	4	3	1			
Toronto	578	96	294	188						
Montreal	2,300	1,234	593	390	2	69	12	43	13	12
Quebec	715	358	294	61			1		1	
Sherbrooke	218	15	84	118						1
St. John	168	41	63	64						
Halifax	266	157	91	9	1	6			2	
Winnipeg	655	211	88	356						
Vancouver	918	227	264	427						
Victoria	325	136	101	54				14	14	6
Totals	7,727	2,929	2,380	2.280	7	78	15	57	30	19

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

APPENDIX J.

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1900.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	$ cts.
Belleville	Belleville Gas Co	1	C. I. R., Belleville	1899-1900.	57	400	970	10 00	
	Trenton Electric Co., Ltd	2	" "	"	35	1,000	1,350	25 00	
	R. R. Casement & Co., Madoc	3	" "	"	....	350	350	10 00	
	Corporation of the Town of Picton	4	" "	"	17	265	435	10 00	
	Pratt, Patching & Co., Tweed	5	" "	"	....	400	400	5 00	
	Municipal Corporation of the Village of Alexandria	1	" Cornwall	"	....	500	500	10 00	
	Vankleek Hill Electric Co., Ltd	2	" "	"	....	750	750	10 00	
	Stormont Electric Light and Power Co., Ltd, Cornwall	3	" "	"	....	1,400	1,400	25 00	
	Kingston Light, Heat and Power Co	1	" Kingston	"	115	2,000	3,150	25 00	
	Napanee Water and Electric Light Co	2	" "	"	26	900	1,160	25 00	
	John R. Scott Co., Ltd, Napanee	3	" "	"	....	2,100	2,100	25 00	
	Port Hope Electric Light and Power Co., Ltd	1	" Peterborough	"	35	1,100	1,450	25 00	
	Light, Heat and Power Co. of Lindsay, Ltd	2	" "	"	75	7,000	7,750	25 00	
	Fenelon Falls Electric Light Co., Ltd	3	" "	"	....	450	450	10 00	
	H. W. Foulds & Co., Hastings	4	" "	"	12	359	479	10 00	
	W. C. Harrison, Norwood	5	" "	"	13	360	490	10 00	
	Lakefield Electric Light Company	6	" "	"	30	....	300	10 00	
	James A. Spence, Colborne	7	" "	"	20	390	590	10 00	
	Cobourg Electric Light and Power Co., Ltd	8	" "	"	40	1,100	1,500	25 00	
	Newcastle Electric Light Co	9	" "	"	....	220	220	10 00	
	H. R. Carruthers, Millbrook	10	" "	"	10	500	600	10 00	
	Corporation of the Village of Campbellford	11	" "	"	22	986	1,206	25 00	
	Peterborough Light and Power Co., Ltd	12	" "	"	130	5,000	6,300	25 00	
	Bowmanville Electric Light Co., Ltd	13	" "	"	30	625	925	10 00	
	A. H. Merkley, Morrisburgh	1	" Prescott	"	....	750	750	10 00	
	Cardinal Electric Light Co., Ltd	2	" "	"	30	600	900	10 00	
	Gananoque Electric Light and Water Supply Co., Ltd	3	" "	"	20	1,000	1,200	25 00	
	Brockville Light and Power Co., Ltd	4	" "	"	35	1,800	2,150	25 00	
	Merrickville Electric Light and Power Co., Ltd	5	" "	"	....	350	350	10 00	
	Corporation of the Town of Prescott	6	" "	"	16	800	960	10 00	
	Kemptville Electric Light Co	7	" "	"	....	700	700	10 00	
									485 00

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1900.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	$ cts.
Hamilton......	J. H. Elliott, Port Dover	1	C. I. R., Brantford	1899-1900.	8	250	330	10 00	
	Simcoe Gas and Water Co.	2	" "	"	26	......	260	10 00	
	Woodstock Electric Light, Power and Street Railway Co., Ltd.	3	" "	"	70	600	1,300	25 00	
	Ingersoll Electric Power and Light Co., Ltd.	4	" "	"	36	60	420	10 00	
	James Munro, Embro	5	" "	"	..	260	260	10 00	
	Herbert Webster, Norwich	6	" "	"	......	350	350	10 00	
	Brantford Electric and Operating Co., Ltd.	7	" "	"	160	4,000	5,600	25 00	
	Brantford Street Railway Co.	8	" "	"	......	2,000	2,000	25 00	
	Paris Electric Light Co.	9	" "	"	45	400	850	10 00	
	Port Rowan Electric Light Supply	10	" "	"	17	105	275	10 00	
	Tilsonburg Electric Light Works	11	" "	"	16	650	810	10 00	
	Hamilton Electric Light and Power Co., L'd	1	" Hamilton	"	475	18,000	22,750	25 00	
	Electrical Power and Manufacturing Co., Ltd, Hamilton	2	" "	"	....	320	320	10 00	
	Dundas Electric Co., Ltd	3	" "	"	8	450	530	10 00	
	Corporation of the Town of Thorold	1	" St Catharines	"	30	380	680	10 00	
	Dunnville Electric Light Co., Ltd	2	" "	"	23	983	1,213	25 00	
	Corporation of the Town of Niagara	3	" "	"	..	800	800	10 00	
	St. Catharines Electric Light and Power Co., Ltd	4	" "	"	80	1,500	2,300	25 00	
	Welland Electric Light Co	5	" "	"	16	250	410	10 00	
	Niagara Falls Electric Light and Power Co., Ltd.	6	" "	"	53	2,000	2,530	25 00	
	J. W. Van Dyke, Grimsby	7	" "	"	....	650	650	10 00	
	William Cooke, St. Catharines	8	" "	"	.....	500	500	10 00	
	Cayuga Electric Light and Power Co.	9	" "	"	9	400	490	10 00	
	H. D. Symmes, Merritton	10	" "	"	21	450	660	10 00	
	Maple Leaf Rubber Co., Port Dalhousie	11	" "	"	20	500	700	10 00	
									355 00
London.........	Sarnia Gas and Electric Light Co.	1	" London	"	63	600	1,230	25 00	
	St. Thomas Gas Co	2	" "	"	90	600	1,500	25 00	
	Strathroy Electric Co., Ltd	3	" "	"	15	600	750	10 00	
	John Norwood, Alvinston	4	" "	"	13	200	330	10 00	
	London Electric Co., Ltd	5	" "	"	350	15,000	18,500	25 00	
	Hamilton & Prout, Forest	6	" "	"	11	300	410	10 00	
	Petrolea Electric Light, Heat and Power Co., Ltd	7	" "	"	40	1,800	2,200	25 00	

	Fitzgerald & Sauermann, Watford	8	"	"	"	12	400	520	10 00	
	H. C. Baird & Son, Parkhill	9	"	"	"	....	350	350	10 00	
	Aylmer Electric and Manufacturing Co., Ltd	10	"	"	"	12	800	920	10 00	
	Bella A. Gordon, Glencoe	11	"	"	"	18	300	480	10 00	
	Cook & Sons, Lucan	12	"	"	"	....	300	300	5 00	
	Dutton Electric Light Co., Ltd	13	"	"	"	4	328	368	10 00	
	Jacob, L. Eidt	1	"	Stratford	"	...	175	175	10 00	
	Corporation of the Town of Mitchell	2	"	"	"	38	600	980	10 00	
	Jowett Bros., Bayfield	3	"	"	"	......	103	103	10 00	
	Corporation of the Town of Goderich	4	"	"	"	33	1,400	1,730	25 00	
	Palmerston Electric Light Co	5	"	"	"	4	400	440	10 00	
	St. Mary's "	6	"	"	"	15	500	650	10 00	
	Clinton "	7	"	"	"	20	650	850	10 00	
	John C. Hay, Listowell	8	"	"	"	26	......	260	10 00	
	Stratford Gas Co	9	"	"	"	100	1,500	2,500	25 00	
	Cook Bros., Hensall	10	"	"	"	......	330	330	10 00	
	Brussels Electric Light Co	11	"	"	"	9	350	440	10 00	
	Seaforth Electric Light, Heat and Power Co., Ltd	12	"	"	"	50	1,300	1,800	25 00	
	J. G. Field, Tavistock	13	"	"	"	......	300	300	10 00	
	Wingham Electric Light Co	14	"	"	"	50	1,200	1,700	25 00	
	Exeter Electric Light and Power Co	15	"	"	"	10	700	800	10 00	
	Blyth Electric Light Plant	16	"	"	"	18	400	580	10 00	
	Ingram & Donaldson, Wroxeter	17	"	"	"	......	200	200	10 00	
	J. A. Williams, Zurich	18	"	"	"	......	125	125	10 00	
	Leamington Electric Light Co., Ltd	1	"	Windsor.	"	14	710	850	10 00	
	Smith & Henderson, Blenheim.	2	"	"	"	9	46	136	10 00	
	George Munro, Thamesville	3	"	"	"	7	375	445	10 00	
	Amherstburg Electric Light, Heat and Power Co., Ltd.	4	"	"	"	.....	915	915	10 00	
	Louis Goodchild, Harrow	5	"	"	"	....	300	300	10 00	
	Chatham Gas Co	6	"	"	"	...	1,500	1,500	25 00	
	People's Electric Co., Ltd., Windsor	7	"	"	"	1	4,825	4,835	25 00	
	Wm. McMaster, Ridgetown	8	"	"	"	22	660	880	10 00	
	Kingsville Electric Light Co	9	"	"	"	11	350	460	10 00	
	R. H. Smith, Tilbury	10	"	"	"	14	280	420	10 00	
	Hiram Walker & Sons, Ltd., Walkerville	11	"	"	"	9	2,220	2,310	25 00	
	Essex Electric Light Co.	12	"	"	"	13	500	630	10 00	
	John E. Gordon, Dresden	13	"	"	"	.....	400	400	10 00	
	Wallaceburg Electric Light Co	14	"	"	"	19	1,005	1,195	25 00	
	Corporation of the Town of Bothwell	15	"	"	"	15	150	300	10 00	635 00
Ottawa	Ottawa Electric Co	1	"	Ottawa	"	621	77,255	83,465	25 00	
	Albert McLaren, Buckingham	2	"	"	"	...	997	997	10 00	
	Hull Electric Co	3	"	"	"	12	3,000	3,120	25 00	
	Deschênes Electric Co., Ltd	4	"	"	"	8	1,700	1,780	25 00	
	Mattawa Electric Light and Power Co., Ltd	1	"	Perth	"	.....	900	900	10 00	
	Almonte Electric Light Co, Ltd	2	"	"	"	20	1,600	1,800	25 00	
	Arnprior Electric Light and Power Co., Ltd	3	"	"	"	24	2,000	2,240	25 00	
	Carleton Place Electric Light Co	4	"	"	"	28	1,800	2,080	25 00	
	Smith's Falls Electric Power Co., Ltd	5	"	"	"	25	1,800	2,050	25 00	
	Perth Electric Light Co., Ltd	6	"	"	"	45	....	450	10 00	

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the year ended June 30, 1900.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	$ cts.
Ottawa—*Con.*	Canadian Electric and Water Power Co., Ltd., Perth	7	C. I. R. Perth—*Con.*	1899-1900	....	1,875	1,875	25 00	
	Citizen's Electric Light Co., Smith's Falls	8	" "	"	....	1,200	1,200	25 00	
	Star Electric Light Co., Eganville	9	" "	"	....	350	350	10 00	
	Catharine Bonfield Electric Light Co. of Eganville	10	" "	"	....	500	500	10 00	
	Pembroke Electric Light Co., Ltd	11	" "	"	22	2,900	3,120	25 00	
	Corporation of the Town of Sudbury	12	" "	"	15	880	1,030	25 00	
	W. A. Mackay, Renfrew	13	" "	"	....	....	1,000	10 00	
	A. W. Wright "	14	" "	"	....	1,000	1,000	10 00	
	John Bourke, North Bay	15	" "	"	15	900	1,050	25 00	
	Pakenham Electric Light Co	16	" "	"	....	400	400	10 00	
									380 00
Toronto	Corley & Collins, Mount Forest	1	" Guelph	"	14	600	740	10 00	
	Howes & Leighton, Harriston	2	" "	"	12	200	320	10 00	
	Berlin Gas Co	3	" "	"	45	746	1,196	25 00	
	Guelph Light and Power Co	4	" "	"	104	2,414	3,454	25 00	
	J. S. Shantz, Hespeler	5	" "	"	27	25	295	16 00	
	A. Groves, Fergus	6	" "	"	17	700	870	10 00	
	Galt Gas Light Co., Ltd	7	" "	"	59	462	1,052	25 00	
	Waterloo Electric Light and Power Co	8	" "	"	24	900	1,140	25 00	
	Jacob Morley, New Hamburg	9	" "	"	24	210	450	10 00	
	John Shearer, Preston	10	" "	"	....	400	400	10 00	
	James Fenwick "	11	" "	"	32	.....	320	10 00	
	Drayton Electric Light Co	12	" "	"	5	201	251	10 00	
	Owen Sound Electric, Illuminating and Manufacturing Co.	1	" Owen Sound	"	55	375	925	10 00	
	Chesley Incandescent Electric Light Plant	2	" "	"	....	400	400	10 00	
	H. Genetzer, Hanover	3	" "	"	16	1,375	1,535	25 00	
	Corporation of the Town of Kincardine	4	" "	"	17	800	970	10 00	
	W. Moore & Sons, Meaford	5	" "	"	19	700	890	10 00	
	Saugeen Electric Light and Power Co., Southampton	6	" "	"	..	1,240	1,240	25 00	
	Robertson, Rowland and Co., Walkerton	7	" "	"	26	1,200	1,460	25 00	
	Wiarton Electric Light Co	8	" "	"	20	500	700	10 00	
	Walter Stewart & Son, Lucknow	9	" "	"	12	325	445	10 00	
	R. P. Bearman, Chesley	10	" "	"	30	300	600	10 00	

	Kilmer, Crawford & McIntyre, Durham	11	"	" ...	"	..	800	800	10 00	
	Corporation of the Town of Collingwood	12	"	" ...	"	35	1,600	1,950	25 00	
	Minnis Bros., Markdale	13	"	" ...	"	......	700	700	10 00	
	Thos. Andrews, Thornbury	14	"	" ...	"	3	400	430	10 00	
	Joseph Schnitzler, Mildmay	15	"	" ...	"	......	160	160	10 00	
	Paisley Electric Light Co	16	"	" ...	"	......	470	470	10 00	
	N. Wauger & Bros., Ayton	17	"	" ...	"	......	100	100	10 00	
	Teeswater Light and Power Co	18	"	" ..	"	..	375	375	10 00	
	Corporation of the Town of Orillia	1	"	Toronto	"	47	2,810	3,280	25 00	
	Alliston Electric Light Co	2	"	"	"	6	600	660	10 00	
	Corporation of the Town of Bracebridge	3	"	"	"	......	1,800	1,800	25 00	
	Thomas Norton, Shelburne	4	"	"	"	33	90	420	10 00	
	Creemore Electric Light Co	5	"	"	"	......	350	350	10 00	
	Tottenham Electric Light Plant	6	"	"	"	....	206	206	10 00	
	Aurora Electric Light Co	7	"	"	"	3	300	330	10 00	
	Oshawa Electric Light Co., Ltd	8	"	"	"	30	600	900	10 00	
	Cannington Electric Light Co	9	"	"	"	10	390	490	10 00	
	Penetanguishene and Midland Electric Street Railway, Light and Power Co., Ltd	10	"	"	"	14	800	940	10 00	
	Whitby and Lakefield Electric Light Co	11	"	"	"	27	240	510	10 00	
	Tagona Water and Light Co., Sault Ste. Marie	12	"	"	"	52	1,580	2,100	25 00	
	Stayner Electric Light Co	13	"	"	"	......	660	660	10 00	
	W. H. Summerfeldt & Son, Sutton	14	"	"	"	.....	275	275	10 00	
	Carnegie & Curry, Port Perry	15	"	"	"	12	300	420	10 00	
	Alexander Dobson, Beaverton	16	"	"	"	...	500	500	10 00	
	Corporation of the Village of Huntsville	17	"	"	"	......	953	953	10 00	
	Oakville Electric Light Co	18	"	"	"	25	710	960	10 00	
	Toronto Electric Light Co., Ltd	19	"	"	"	1,650	75,000	91,500	25 00	
	I. J. Gould, Uxbridge	20	"	"	"	25	500	750	10 00	
	Midland Electric Co., Ltd	21	"	"	"	35	750	1,100	25 00	
	Corporation of the Town of Newmarket	22	"	"	"	......	900	900	10 00	
	John Philip, Grand Valley	23	"	"	"	3	500	530	10 00	
	Parry Sound Electric Light Co., Ltd	24	"	"	"	...	1,258	1,258	25 00	
	Glen Williams Electric Light Co	25	"	"	"	20	400	600	10 00	
	R. D. George, Stouffville	26	"	"	"	.....	375	375	10 00	
	Milton Electric Light and Power Co., Ltd	27	"	"	"	20	425	625	10 00	
	Corporation of the Village of Acton	28	"	"	"	......	600	600	10 00	
	Corporation of the Town of Barrie	29	"	"	"	40	3,000	3,400	25 00	
	Gravenhurst Electric Light and Power Co	30	"	"	"	10	765	865	10 00	
	Hutton Electric Co., Brampton	31	"	"	"	30	600	900	10 00	
	Orangeville Electric Light and Power Co	32	"	"	"	28	1,000	1,280	25 00	
	Water, Light and Power Co., Burk's Falls	33	"	"	"	....	500	500	10 00	
	Municipality of the Village of Markham	34	"	"	"	....	356	356	10 00	
	Corporation of the Village of Beeton	35	"	"	"	...	610	610	10 00	
										890 00
Montreal......	Corporation de la Ville de Joliette	1	"	Joliette.....	"	30	1,622	1,922	25 00	
	La compagnie de lumière électrique de la ville de Terrebonne	1	"	Montreal....	"	.....	800	800	10 00	
	Valleyfield Electric Co., Ltd	2	"	"	"	53	1,500	2,030	25 00	
	Jean Roux, Ste. Thérèse	3	"	"	"	.....	200	200	10 00	
	St. Jérôme Power Electric Light Co., Ltd.	4	"	"	"	.	700	700	10 00	

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1900.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	
Montreal—*Con.*	Corporation of the Village of Huntingdon	5	C. I. R., Montreal—*Con.*	1899 1900		720	720	10 00	
	Gazette Printing Co., Montreal	6	" "	"	.....	800	800	10 00	
	Royal Electric Co., Montreal	7	" "	"	1,805	78,762	96,812	25 00	
	Beauharnois Electric Light Co., J. B. Robert, Proprietor	8	" "	"	....	400	400	10 00	
	La compagnie de lumière électrique Impériale	9	" "	"	9	9,500	9,590	25 00	
	Lachine Rapids Hydraulic and Land Co., Ltd., Montreal	10	" "	"	350	50,382	53,882	25 00	
	Laurentian Water and Power Co., Ste. Agathe des Monts	11	" "	"		600	600	10 00	
	Corporation of the Town of Lachine	12	" "	"	43	2,225	2,655	25 00	
	Standard Light and Power Co., Montreal	13	" "	"	20	110	310	10 00	
	Lachute Electric Light Co	14	" "	"		200	200	10 00	
	J. T. Ayers, Lachute	15	" "	"		800	800	10 00	
	North Shore Power Co	1	" Three Rivers.	"	80	2,650	3,450	25 00	275 00
Quebec	La compagnie des eaux et de l'électricité de Chicoutimi	1	" Quebec	"		1,500	1,500	25 00	
	Fraserville, Co., Ltd	2	" "	"	6	1,200	1,260	25 00	
	Compagnie manufacturière et électrique de Montmagny	3	" "	"	....	686	686	10 00	
	Quebec Railway Light and Power Co	4	" "	"	498	25,093	30,973	25 00	
	Jacques-Cartier Water and Power Co., Quebec	5	" "	"		1,800	1,800	12 50	97 50
Sherbrooke	D. Champoux & Bros., Disraeli	1	" Sherbrooke	"		700	700	10 00	
	Knowlton Electric Light Co	2	" "	"		350	350	10 00	
	Richmond County Electric Co., Richmond	3	" "	"	....	1,400	1,400	25 00	
	Stanstead Electric Light Co	4	" "	"	18	700	880	10 00	
	W. S. Foster, Waterloo	5	" "	"	......	1,000	1,000	10 00	
	G. R. Nesbitt, Cowansville	6	" "	"	.....	300	300	10 00	
	Parker & Howe, Dixville	7	" "	"	.....	110	110	10 00	
	Sherbrooke Gas and Water Co	8	" "	"	53	5,000	5,530	25 00	
	Eastern Townships Electric Co., North Hatley	9	" "	"		700	760	10 00	
	Coaticook Electric Light and Power Co	10	" "	"	28	1,400	1,680	25 00	
	Corporation of the Village of Granby	11	" "	"	31	1,200	1,540	25 00	
	Corporation of the Town of Magog	12	" "	"	.....	905	905	10 00	
	French Bros., Sawyerville	13	" "	"	.....	80	80	10 00	
	Corporation of the Town of Farnham	14	" "	"	.....	975	975	10 00	

	St. John's Electric Light Co	15	"	"	"	20	1,500	1,700	25 00	
	La Compagnie d'Eclairage Electrique du Village du Mégantic	16	"	"	"	......	725	725	10 00	
	M. S. Cornell & Sons, Stanbridge East	17	"	"	"	......	100	100	10 00	
	Corey & Campbell, Bedford	18	"	"	"	....	560	560	10 00	
	Napoléon Lemay, St. Camille	19	"	"	"	......	150	150	10 00	
	La Compagnie d'Eclairage au Gaz de St. Hyacinthe	1	"	St. Hyacinthe	"	27	40	310	10 00	
	La Compagnie de Pouvoirs Hydrauliques de St. Hyacinthe	2	"	"	"	2	5,000	5,020	25 00	
	Boas Manufacturing Co., St. Hyacinthe	3	"	"	"	....	20	20	10 00	
	Achille Gagnon, Victoriaville	1	"	Victoriaville	"	...	3,000	3,000	25 00	
	Corporation of the Town of Drummondville	2	"	"	"	....	500	500	10 00	345 00
St. John	Carleton Electric Light Co	1	"	St. John	"	28	480	760	10 00	
	Fredericton Gas Light Co	2	"	"	"	77	300	1,070	25 00	
	Sackville Electric Light and Telephone Co	3	"	"	"	.....	400	400	10 00	
	Sussex Water and Electric Light Co	4	"	"	"	..	550	550	10 00	
	Woodstock Electric Light Co., Ltd	5	"	"	"	....	1,000	1,000	10 00	
	St. Stephen Electric Light Co	6	"	"	"	48	917	1,397	25 00	
	Chatham Electric Light Co	7	"	"	"	8	2,000	2,080	25 00	
	The Saint John Railway Co	8	"	"	"	418	7,000	11,180	25 00	
	Small & Fisher Co., Ltd., Woodstock	9	"	"	"	....	500	500	10 00	
	Town of Campbellton	10	"	"	"	......	1,800	1,800	25 00	
	City of Moncton Water and Light Department	11	"	"	"	78	800	1,580	25 00	200 00
Halifax	Prince Edward Island Electric Co., Charlottetown	1	"	Charlottetown	"	80	5,000	5,800	25 00	
	Full Electric Light Co. of Prince Edward Island	2	"	"	"	7	1,130	1,200	25 00	
	Montague Electric Co	3	"	"	"	...	300	300	10 00	
	Yarmouth Street Railway Co	1	"	Halifax	"	......	200	200	10 00	
	Dartmouth Gas, Electric Light Heating and Power Co., Ltd	2	"	"	"	.....	990	990	10 00	
	Acadia Edison Electric Co., Wolfville	3	"	"	"	.....	800	800	10 00	
	John Christie, Shubenacadie	4	"	"	"	.....	310	310	10 00	
	Windsor Electric Light and Power Co	5	"	"	"	......	2,500	2,500	25 00	
	Halifax Electric Tramway Co	6	"	"	"	277	15,224	17,994	25 00	
	Town of Parrsboro	7	"	"	"	.....	790	790	10 00	
	Kentville Electric Light and Power Co., Ltd	8	"	"	"	.....	850	850	10 00	
	Yarmouth Gas Light Co., Ltd	9	"	"	"	36	.....	360	10 00	
	Edison Electric Light and Power Co., Ltd., Springhill	10	"	"	"	2	598	618	10 00	
	Bear River Light, Heating and Power Co., Ltd	11	"	"	"	.....	400	400	10 00	
	C. O'Dell Electric Light Co., Ltd., Annapolis	12	"	"	"	...	780	780	10 00	
	Oxford Electric Light Co., Ltd	13	"	"	"	.....	133	133	10 00	
	Bridgewater Power Co., Ltd	14	"	"	"	.....	300	300	10 00	
	Chambers' Electric Light and Power Co., Ltd., Truro	15	"	"	"	......	4,000	4,000	25 00	
	Bridgetown Electric Light Plant	16	"	"	"	......	350	350	10 00	
	Lunenburg Gas Co., Ltd	17	"	"	"	.....	1,200	1,200	25 00	
	Canada Electric Co., Ltd., Amherst	18	"	"	"	30	1.800	2,100	25 00	
	John Daley, Digby	19	"	"	"	....	400	400	10 00	
	Antigonish Electric Light and Power Co	1	"	Pictou	"	.....	800	800	10 00	
	New Glasgow Electric Co., Ltd	2	"	"	"	27	3,500	3,770	25 00	
	North Sydney Electric Light Co	3	"	"	"	...	1,400	1,400	25 00	
	Sydney Gas and Electric Light Co., Ltd	4	.	"	"	.....	1,400	1,400	25 00	410 00

APPENDIX—J *Concluded.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the year ended June 30, 1900.

District.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	$ cts.
Winnipeg...	Calgary Water Power Co., Ltd.	1	C. I. R., Calgary	1899-1900	25	1,800	2,050	25 00	
	Lethbridge Water Works and Electric Light Co., Ltd	2	" "	"		900	900	10 00	
	Edmonton Electric Lighting and Power Co., Ltd	3	" "	"		1,300	1,300	25 00	
	Corporation of the Town of Port Arthur	1	" Port Arthur	"		1,052	1,052	25 00	
	Board of Water and Light Commissioners, Fort William	2	" "	"	350	1,250	1,600	25 00	
	Prince Albert Electric Light and Power Co	1	" Winnipeg	"		500	500	10 00	
	Brandon Electric Light Co., Ltd	2	" "	"		5,000	5,000	25 00	
	W. J. Bruce, Selkirk	3	" "	"		600	600	10 00	
	Citizen's Telephone and Electric Light Co., Ltd., Rat Portage	4	" "	"	10	7,000	7,100	25 00	
	Central Electric Co., Portage la Prairie	5	" "	"	10	1,750	1,850	25 00	
	Winnipeg Electric Street Railway Co	6	" "	"	150	12,800	14,300	25 00	
	John B. Maul, Morden	7	" "	"		700	700	10 00	
	Regina Electric Light and Power Works	8	" "	"	9	1,200	1,290	25 00	
	Corporation of Town of Neepawa	9	" "	"	17	500	670	5 00	
									270 00
Vancouver. ...	British Columbia Electric Railway Co., Ltd., Vancouver	1	" Vancouver	"	356	21,479	25,039	25 00	
	Corporation of the City of Nelson	2	" "	"	20	2,500	2,700	25 00	
	Corporation of the City of New Westminster	3	" "	"	92	3,000	3,920	25 00	
	City of Kamloops	4	" "	"		1,000	1,000	25 00	
	Trail Smelter Electric Department	5	" "	"	9	500	590	10 00	
	West Kootenay Power and Light Co., Ltd	6	" "	"	4	500	540	10 00	
	Sandon Water Works and Light Co	7	" "	"	8	967	1,047	25 00	
	Kootenay Electric Co., Ltd., Kaslo	8	" "	"		835	835	10 00	
	Revelstroke Water, Light and Power Co., Ltd	9	" "	"		1,000	1,000	25 00	
	The City of Grand Forks	10	" "	"	5	516	566	10 00	
									190 00
Victoria	Nanaimo Electric Light, Power and Heating Co., Ltd	1	" Victoria	"	68	600	1,280	25 00	
	Victoria Electric Co., Ltd	2	" "	"		301	301	10 00	
	British Columbia Electric Railway Co., Ltd., Victoria	3	" "	"	25	13,585	13,830	25 00	
									60 00
	Grand Total								1,952 50

INLAND REVENUE DEPARTMENT,
OTTAWA, September 22, 1900.

E. MIALL,
Commissioner.

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1900

PART III

ADULTERATION OF FOOD

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
EXCELLENT MAJESTY
1901

[No. 14 –1901.]

CONTENTS.

REPORT

OF THE

COMMISSIONER OF INLAND REVENUE.

INSPECTION OF FOODS, DRUGS AND FERTILIZERS.

To the Honourable
The Minister of Inland Revenue.

SIR,—I have the honour herewith to submit the report of the official analysts of the Dominion for the fiscal year ended June 30, 1900.

The following is a summary statement of the whole number of samples analysed by them:—

Description of Sample.	Genuine.	Adulterated.	Doubtful.	Total.
Olive oil	38	24	5	67
Condensed milk	131	4	10	145
Baking powder	32	46	....	78
Cloves	27	15	5	47
Scotch whiskey	19	....	9	28
Pepper	56	21	....	77
Native wine	34	32	11	77
Corn	3	....	....	3
Spirits of camphor	9	5	....	14
Cocoa and chocolate	32	3	2	37
Fertilizers	60	8	2	70
Cream of tartar	43	12	2	57
Honey	16	6	....	22
Salt	16	2	....	18
Saltpetre	2	8	....	10
Hop beer	6	....	....	6
Total	524	186	46	756

There does not appear to be any feature calling for special comment, beyond the remarks made by individual analysts and the Chief Analyst.

I have the honour to be, sir,
Your obedient servant,
EDWARD MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, January 4, 1901.

REPORT OF CHIEF ANALYST.

JANUARY 2, 1901.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—In view of the early publication of the Adulteration of Food Report for the fiscal year ended June 30, 1900, I beg to remind you of the recommendations which have been made, from time to time, regarding the establishment of standards of quality for, and limits of variability permissible in certain articles of food, with the object of obtaining action by the Governor in Council under section 19 of the Adulteration Act. Of course those recommendations have no reference to agricultural fertilizers, the standards of which are fixed by the Fertilizers Act, nor to drugs which are regulated by the British Pharmacopœia, nor to those articles whose qualities are defined under the Act in restraint of fraudulent marking.

MILK.

Whole milk shall not contain less than 3·5 per cent butterfat, 8·5 per cent non-fatty solids, and 12 per cent total solids.

COFFEE.

When coffee is sold as a mixture or compound it shall consist only of chicory and coffee; the proportion of the former not to exceed 20 per cent.

LARD

When sold as a compound it shall not contain more than 10 per cent of beef tallow.

BAKING POWDER

Shall not contain more than 20 per cent starch or flour, and be entirely free from substances containing alumina.

BUTTER

Shall not contain more than 15 per cent water, 5 per cent salt and 2 per cent curd.

MUSTARD.

The genuine article shall not contain less than 30 per cent of fixed oil, and the compound or mixture, not less than 22 per cent.

PEPPERS

Shall not contain more than 8 per cent ash.

MOLASSES

Shall not contain less than 40 per cent cane sugar.

SYRUPS

Shall not contain less than 35 per cent cane sugar.

Brandy

Shall not contain less than 48 per cent by volume of alcohol, and not more than 0·2 per cent total solids.

Rum

Shall not contain less than 48 per cent by volume of alcohol.

Whiskey

Shall not contain less than 48 per cent by volume of alcohol, and not more than 0·2 per cent total solids.

Hollands and Old Tom.

These liquors shall not contain less than 48 per cent by volume of alcohol.

Vinegar

Shall not contain less than 3 per cent acetic anhydride, or 3·5 per cent of glacial acetic acid.

Wine

Shall be produced by alcoholic fermentation from the juice of fresh grapes only, without any addition of foreign sugar or alcohol.

Beer

Shall be prepared by alcoholic fermentation from barley-malt, hops, yeast and water only.

Dr. John Baker Edwards, who was appointed District Analyst in Montreal, on the 1st July, 1875, died on the 15th January, 1900. The following is a statement of the food samples submitted to him for examination from the 1st July, 1899, until the time of his death.

Description of Samples.	Genuine.	Adulterated.	Doubtful.	Total.
Olive oil	6	4	1	11
Condensed milk	22			22
Baking powder	3	8		11
Cloves	8	3		11
Pepper	5	6		11
Native wine		10	1	11
Total	44	31	2	77

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

REPORTS OF PUBLIC ANALYSTS.

LABORATORY OF THE OFFICIAL ANALYST FOR
NOVA SCOTIA AND PRINCE EDWARD ISLAND,
66, BEDFORD ROW,
HALIFAX, N.S., October 25, 1900.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit my report on the samples of food, &c., analysed by me under the Adulteration Act, during the year ending June 30, 1900.

Samples.	Genuine.	Adulterated.	Doubtful.	Total.
Condensed milk	20			20
Olive oil	7	1	2	10
Baking powder	9	2		11
Cloves	5		5	10
Pepper	9	1		10
Wine		10		10
Hop beer	6			6
Honey	11	5		16
Cream of tartar	10			10
Total	77	19	7	103

I have the honour to be, sir,
Your obedient servant,

MAYNARD BOWMAN.

QUEBEC ANALYST'S ANNUAL REPORT. July 1, 1899, to June 30, 1900.

Kind of Sample.	Number.	Genuine.	Doubtful.	Adulterated.	Sold as compound
Olive oil—(July, 1899)	10	6	0	4	0
Condensed milk—(August, 1899)	10	7	3	0	0
Baking powder—(September, 1899)	10	1	0	9	0
Cloves—(October, 1899)	10	7	0	3	0
Pepper—(November, 1899)	10	6	0	4	0
Native wine—(December, 1899)	10	0	10	0	0
Condensed milk—(January, 1900)	11	8	3	0	0
Cocoas and Chocolate—(February, 1900)	9	7	2	0	0
Fertilizers—(April, 1900)	11	10	0	1	0
Fertilizers—(May, 1900)	10	8	0	2	0
Cream of tartar—(June, 1900)	11	10	0	1	0
Totals	112	70	18	24	0

NOTE.—The work done in March, 1900, was on the Standard Fertilizers,—eleven samples.

DR. M. FISET, M.D.,
Public Analyst.

LABORATORY, Quebec, July 24, 1900.

OTTAWA, August 22, 1900.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour of submitting to you my report for the past year. I have examined in all 110 samples as shown in the following table :—

Samples.	Genuine.	Adulterated.	Doubtful.	Total.
Olive oil	4	3	2	9
Condensed milk	15	3	....	18
Whiskey	2	....	7	9
Baking powder	4	5	....	9
Pepper	5	4	....	9
Wine	5	4	....	9
Corn	3	....	....	3
Cocoa and chocolate	7	....	....	7
Spirits of camphor	9	....	....	9
Fertilizers	8	2	....	10
Common Salt	7	2	....	9
Cream of tartar	6	1	2	9
Total	75	24	11	110

I have the honour to be, sir,

Your obedient servant,

F. X. VALADE, M.D.,

Public Analyst.

SCHOOL OF PRACTICAL SCIENCE,
TORONTO, November 1, 1900.

SIR,—I beg to submit herewith my annual report on the work done on the samples analysed in my laboratory during the year 1899–1900.

During this year 118 samples of food have been examined, inclusive of fertilizers, with the results shewn in the following table :—

Samples.	Total.	Genuine.	Adulterated.	Doubtful.	Remarks.
Olive oil	10	6	4		
Condensed milk	20	17	....	3	Fat below average.
Scotch whiskey	10	10	....	....	
Baking powder	10	4	6	....	4 alum phosphate and 2 alum baking powder.
Pepper	10	10	....	....	1 pepper was marked "compound" and 2 "compounds" were dirty.
Native wine	10	10	....	....	
Cocoa and chocolate	8	8	....	....	
Fertilizers	20	18	....	2	1 below guarantee in potash, 1 below standard in available $P_2 O_5$. 4 no guarantee.
Saltpetre	10	2	8	....	6 were sodium nitrate, 2 were mixed sodium and potassium nitrate.
Cream of tartar	10	10	....	....	
Total	118	95	18	5	

I have the honour to be, sir,
Your obedient servant,

W. H. ELLIS.

OFFICE OF PUBLIC ANALYST,
LONDON, June 30, 1900.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement of result of the analyses of samples, submitted to me by the Department during the past year :—

Samples.	Genuine.	Adulterated.	Doubtful.	Total.
Olive oil	5	4		9
Condensed milk	16		1	17
Scotch whiskey	7		2	9
Spirit of camphor		5		5
Baking powder	2	7		9
White pepper	4	5		9
Native Canadian wine	1	8		9
Honey	5	1		6
Cocoa		3		3
Chocolate	3			3
Fertilizers	8	1		9
Salt	9			9
Cream of tartar	1	8		9
Total	61	42	3	106

I have the honour to be, sir,
Your obedient servant,

FRANKLIN T. HARRISON.

ST. JOHN'S COLLEGE,
WINNIPEG, CANADA, June 30, 1900.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement showing the general results of the examination of samples submitted to me by the Department during the year ending June 30, 1900:—

Samples.	Genuine.	Adulterated.	Total.
Condensed milk	18	1	19
Olive oil	4	4	8
Baking powder	1	9	10
Cloves	3	7	10
Pepper	10	0	10
Wine	10	0	10
Cocoa and chocolate	7	0	7
Cream of tartar	6	2	8
Fertilizers as sold	8	2	10
Total	67	25	92

I have the honour to be, sir,
Your obedient servant,

EDGAR B. KENRICK.

PUBLIC ANALYST'S OFFICE,
VICTORIA, B.C., November 3 1900.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to submit report for year ending June 30, 1900:—

Samples.	Genuine.	Adulterated.	Total.
Baking powder	8	0	8
Cloves	4	2	6
Pepper	7	1	8
Wine	8	0	8
Condensed milk	8	0	8
Total	35	3	38

I have returned baking powders as genuine although six were "alum phosphate powder." I am satisfied I made a mistake, and will in future return such powders as adulterated, as I am convinced they are harmful.

I have the honour to be, sir,
Your obedient servant,

C. J. FAGAN.

APPENDIX A.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer and Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Specific Gravity.	Result of Analysis — Water.	Cane Sugar.	Reducing Sugar as Lactose.	Total Ash.	Casein.
1899.	*Official Analyst, M. Bowman, Halifax, N.S.*				p. c.	p. c.	p. c.	p. c.	p. c.
July 18	"Mayflower," Truro Condensed Milk and Canning Co., Truro, N.S.	12714	17667	1·283	30·67	36·89	13·20	1·94	8·06
" 18	"Red Star," Canada Milk Condensing Co., Antigonish, N.S.	12715	17668	1·282	30·50	37·42	13·48	1·80	8·18
" 26	"Reindeer," Truro Condensed Milk Co.	12716	17670	1·307	26·64	40·21	13·26	1·95	8·25
" 26	"Red Star," Canada Milk Condensing Co.	12717	17671	1·288	30·33	36·51	14·13	1·96	8·12
" 28	"Reindeer," Truro Condensed Milk Co.	12718	17673	1.293	29·57	40·56	11·94	1·93	7·50
" 19	" " "	12709	16728	1·295	26·00	41·47	13·51	1·99	7·50
" 19	"Beaver" " "	12710	16729	1·319	29·08	41·09	14·89	1·86	7·69
" 21	"Milkmaid," Anglo-Swiss Condensed Milk Co.	12711	16730	1·312	26·05	40·55	15·68	2·10	6·31
" 21	"Owl," Canada Milk Condensing Co., Antigonish, N.S.	12712	16731	1·293	31·71	32·80	18·06	1·60	8·37
" 22	"Mayflower," Truro Condensed Milk Co.	12713	16732	1·308	27·98	42·70	13·56	1·89	7·87
	Official Analyst, Dr. M. Fiset, Quebec.								
" 13	"Export," Baldwin Condensed Milk Co.	10158	19554	1·301	28·90	31·89	19·90	1·49	8·62
" 13	"Reindeer," Truro Condensed Milk Co.	10159	19555	1·292	30·80	29·92	19·50	1·92	8·56
" 13	"Canadian," Baldwin Condensed Milk Co.	10160	19556	1·291	32·85	32·34	18·19	2·02	8·00
" 13	"Owl," Canadian Milk Condensing Co.	10161	19557	1·301	27·30	37·77	13·90	1·93	8·75
" 13	"Mayflower," Truro Condensed Milk Co.	10162	19558	1·294	29·60	38·70	13·13	2·12	8·25
" 13	"Highland," Helvetia Milk Condensing Co.	10163	19559	1·086	67·90	None.	12·50	1·75	8·31
" 14	"Eagle," New York Condensed Milk Co.	10164	19560	1·306	28·00	39·85	12·86	1·63	8·06
" 14	"Nestles," H. Nestle, Switzerland	10165	19561	1·305	26·05	37·83	14·77	1·85	8·50
" 14	"Export," Baldwin Condensed Milk Co.	10166	19562	1·307	28·60	40·22	12·68	1·57	8·03
" 14	"Canadian" " "	10167	19563	1·295	27·80	38·18	13·47	1·65	8·55
	Official Analyst, Dr. J. B. Edwards, Montreal.								
" 10	"Reindeer," Truro Condensed Milk Co.	15616	19530	1·289	29·81	38·12	12·31	1·90	7·01
" 10	"Owl," Canada Milk Condensing Co.	15617	19531	1·298	30·90	37·83	11·70	2·14	8·50
" 10	"Export," Baldwin Milk Condensing Co.	15618	19532	1·310	30·00	40·02	11·21	2·03	8·24
" 12	"Nestles," H. Nestle, Switzerland	15619	19533	1·314	28·23	39·04	13·23	2·02	8·27
" 12	"Eagle," New York Condensed Milk Co.	15620	19534	1·310	28·62	41·58	11·24	1·77	7·36
" 26	"Viking," Norwegian Milk Condensing Co.	15626	19535	1·104	66·66	1·47	12·38	2·06	8·56
" 26	"Jersey," Forrest Canning Co.	15627	19536	1·330	29·20	41·78	12·64	1·86	7·19
" 26	"Milkmaid," Anglo-Swiss Condensed Milk Co.	15628	19537	1·312	27·82	39·11	12·68	2·05	8·01
" 26	"Mayflower," Truro Milk Condensing Co.	15629	19538	1·307	30·13	38·24	13·34	1·97	7·31
" 26	"Full Weight," Anglo-Swiss Condensed Milk Co.	15630	19539	1.330	27·03	40·63	13·65	1·98	7·60
" 27	"Reindeer," Truro Milk Condensing Co.	15631	19540	1·314	28·85	40·28	13·17	1·87	6·50
	Official Analyst, Dr. F. X. Valade, Ottawa								
Aug. 3	"Reindeer," Truro Milk Condensing Co.	14611	18442	1·294	27·80	41·32	10·06	1·65	9·83
" 3	"Eagle," New York Condensed Milk Co.	14612	18443	1·313	27·64	45·79	10·35	1·93	7·48
" 3	"Nestles," H. Nestle, Switzerland	14613	18444	1·323	26·70	42·20	12·29	1·73	8·98
" 3	"Export," Baldwin Condensed Milk Co.	14614	18445	1·295	28·39	38·96	11·80	1·77	7·40

SESSIONAL PAPER No. 14

CONDENSED MILK—Tabulated Statement.

Total Fat.	Concentration (volume).	Nitrogen.	Total Solids.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.		p. c.	p. c.		
9·24	3·40	...	...	Genuine	F. Goddard, St. John, N.B.
8·62	3·44	...	...	"	G. W. & A. A. Barker, St. John, N.B.
9·69	3·50	...	...	"	H. B. Edwards, Moncton, N.B.
8·95	3·56	...	...	"	J. T. Ryan, Moncton, N.B.
8·50	3·16	...	...	"	Adams, Burns & Co., Bathurst, N.B.
9·53	3·40	...	...	"	A. F. Ross & Co., Truro, N.S.
5·40	3·68	...	...	"	G. & A. Barker, New Glasgow, N.S.
9·31	3·61	...	...	"	B. J. Hubley & Sons, Halifax, N.S.
7·46	4·14	...	...	"	W. E. Crowe & Co. "
7·89	3·48	...	...	"	A. L. Doyle & Co. "
9·20	4·47	...	...	Prepared from partly skimmed milk.	C. S. Riverin, Quebec.
9·30	4·4[illegible]	...	...	" "	L. N. Bergeron "
6·60	4·15	...	...	" "	M. W. Coleman "
10·35	3.65	...	...	Genuine	A. J. Turcotte & Co., Quebec.
8·20	3·47	...	...	"	E. Paquet, Quebec.
9·80	2·77	...	...	"	A. W. Sanborn, Coaticook, P.Q.
9·60	3·30	...	...	"	" "
11·00	3·74	...	...	"	W. H. Fuller & Co., Sherbrooke, P.Q.
8·90	3·32	...	...	"	W. H. Griffith "
10·35	3·5[illegible]	...	...	"	D. W. Stenson "
10·85	...	...	...	Genuine and made from rich milk.	A. Trudeau, Montreal.
8·93	...	...	...	Genuine	O. A. Bigaoutte, Montreal.
8·50	...	...	...	"	P. Daoust, Montreal.
9·21	...	...	...	"	R. Goold, St. Johns, N.B.
9·43	...	...	...	"	Fraser & Viger, Montreal.
8·87	...	...	...	"	Wm. Rourke "
7·33	...	...	...	" but low in butter fat and high in cane sugar.	Barker & Co. "
10·33	...	...	...	Genuine; rich in butter fat	G. Graham "
9·01	...	...	...	"	T. A. Wood & Co. "
9·11	...	...	...	"	E. Elliott "
9·33	...	...	...	"	R. W. Williams, Three Rivers, P.Q.
8·76	3·08	...	...	Genuine, with addition of cane sugar.	Goodall Bros., Ottawa.
6·58	2·83	...	...	" "	H. F. MacCarthy, Ottawa.
7·80	3·32	...	...	" "	Jos. Kavanagh, Ottawa.
11·37	2·97	...	...	" "	Hudson & Powell "

APPENDIX A.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of					
				Specific Gravity.	Water.	Cane Sugar.	Reducing Sugar as Lactose.	Total Ash.	Casein.
1899.	*Official Analyst, Dr. F. X. Valade, Ottawa.*				p. c.	p. c.	p. c.	p. c.	p. c.
Aug. 3	"Canadian," Baldwin Condensed Milk Co.	14615	18446	1·314	28·39	41·88	13·67	1·85	7·43
„ 4	"Reindeer," Truro Condensed Milk Co..	14616	18447	1·325	25·34	36.16	18·43	1·88	9·42
„ 4	"Nestle's," H. Nestle, Switzerland.	14617	18448	....	...	...	...	....	...
„ 4	"Export," Baldwin Condensed Milk Co..	14618	18449	1·332	26·23	42·60	11·32	2·22	8·03
„ 4	"Canadian," Baldwin Condensed Milk Co.	14619	18450	1·314	25·05	43·96	13·53	0·96	7·66
	Official Analyst, Dr. W. H. Ellis, Toronto.								
July 13	"Export," Baldwin Condensed Milk Co..	12360	18423	...	29·14	37·76	12·39	1·77	8·23
„ 13	"Reindeer," Truro Condensed Milk Co..	12361	18424	...	28·07	35·65	12·58	2·09	11·68
„ 13	"Highland" (Evaporated Cream), Helvetia Milk Condensing Co.	12362	18425	...	71·15	None.	12·14	1·69	7·23
„ 13	"Export," Baldwin Condensed Milk Co..	12363	18426	...	27·09	41·93	13·15	1·78	7·69
„ 14	"Eagle," New York Condensed Milk Co	12364	18427	..	26·74	42·90	12·46	1·82	8·77
„ 14	„ „	12365	18428	.....	27·19	43·20	10·48	1·72	9·55
„ 14	"Milkmaid," Anglo Swiss Condensed Milk Co.	12366	18429	....	25·68	40·31	15·28	2·02	8·36
„ 14	"Nestle's," H. Nestle, Switzerland	12367	18430	....	27·63	38·71	14·39	1·98	8·63
„ 14	"Owl," Canada Milk Condensing Co.....	12368	18431	. .	31·97	36·82	14·42	1·83	6·92
„ 19	"Reindeer," Truro Condensed Milk Co..	12369	18432	....	29·64	39·81	11·48	1·94	8·45
	Official Analyst, F. T. Harrison, London, Ont.								
„ 11	"Nestle's," H. Nestle	14110	19260	....	27·20	40·23	13·04	1·83	7·72
„ 11	"Allworth's," (Evaporated Cream), Canadian Condensed Milk Factory, Aylmer, Ont.	14111	19261	...	68·90	None.	11·95	1·85	9·10
„ 12	"Full Weight," Anglo-Swiss Condensed Milk Co.	14112	19265	....	26·70	10·61	12·67	1·52	9·00
„ 13	"Jersey," Forrest Condensed Milk Co., Halifax.	14113	19267	....	29·70	39·85	12·18	1·73	8·09
„ 13	"Eagle," New York Condensed Milk Co.	14114	19268	. .	28·40	42·37	10·46	1·81	8·36
„ 13	"Leader," Michigan Condensed Milk Co.	14115	19270	.....	28·95	43·12	11·08	1·69	8·21
„ 15	"Milkmaid," Anglo-Swiss Condensed Milk Co.	14116	19272	.....	26·99	37·69	13·17	2·04	9·65
„ 14	" "Canadian," A. M. Smith & Co., London, Ont.	14117	19274	.....	27·20	38·71	13·78	1·88	9·13
„ 14	"Owl," Canada Milk Condensing Co., Antigonish, N.S.	14118	19276	.	30·45	39·79	10·83	1·82	8·63
	Official Analyst, Professor E. B. Kenrick, Winnipeg.								
Aug. 7	"Anglo-Saxon," The Canada Milk Condensing Co.	11301	17175	...	27·22	42·86	11·94	1·86	7·84
„ 7	"Reindeer," Truro Condensed Milk Co...	11302	17176	......	28·74	40.15	12·03	1·86	8·25
„ 7	„ „	11303	17177	..	28·07	40·17	12·57	1·87	8·29
„ 7	"Export," Baldwin Condensed Milk Co .	11304	17178	.....	27·02	39·19	12·55	1·82	8·57
„ 8	"Jubilee," The Manitoba Dairy Co	11305	17179	.....	32·52	33.74	14·58	1·86	9·72
„ 8	"Mayflower," Truro Condensed Milk Co	11306	17180	. .	28·25	39·22	12·31	1·83	7·99
„ 8	"Clover" „	11307	17181	......	28·47	43·16	12·22	1·85	8·15
„ 8	"Duchess," Forrest Canning Co., Halifax, N.S.	11308	17182	......	31·82	44·45	12·59	1·86	8·85

CONDENSED MILK—Tabulated Statement—*Continued.*

Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
Total Fat.	Concentration (volume).	Nitrogen.	Total Solids.		
p. c.		p. c.	p. c.		
9·79	3·31	...	...	Genuine, with addition of cane sugar.	Kennedy & Co., Ottawa.
9·00	4·29	...	...	Adulterated, being made out of partly skimmed milk.	R. E. Hicks, Perth, Ont.
...	...	...	...	Too badly decomposed, black and bad odour, unfit for human food.	J. F. Kellock "
9·88	3·14	...	...	Genuine, with addition of cane sugar.	W. Mooney, Ottawa.
8·50	3·18	...	...	" "	W. H. Roger "
10·71	...	...	...	Genuine	F. J. Morgan, Brockville.
9·94	...	...	...	"	John Culbert "
7·29	...	...	...	"	S. Hooey, Trenton, Ont.
8·45		...	...	"	" "
7·31	...	...	...	"	Jury & Gregory, Oshawa, Ont.
7·86	...	...	...	"	R. W. & A. Chambers, Oshawa, Ont.
8·35	...	...	...	"	J. Butcher, Toronto.
8·56	...	...		"	E. J. Lemaitre, Toronto.
8·04	...	...	...	"	Rossin House Grocery, Toronto.
8·68	...	...	...	"	W. McEwen, Hull, Que.
9·98	...	...	...	Genuine, with addition of cane sugar.	C. E. Nasmyth & Co., Stratford, Ont.
8·20	...	...	...	Genuine evaporated cream	A. Beattie & Co. "
9.50	...	...	...	Genuine, with addition of cane sugar.	J. Childs, London, Ont.
8·45	...	...	...	" "	F. H. Kaing, Windsor, Ont.
8·60	...		...	" "	Duck & Hutton "
6·95	...		...	Made with milk much below average in fat.	A. Dougall "
10·55	...	...	...	Genuine, with addition of cane sugar. An excellent sample.	W. T. Strong, London, Ont.
9·30	...	...	...	Genuine, with addition of cane sugar.	Thornton Bros., Woodstock, Ont.
8·48	...	...	...	" "	Pool & Co. "
8·28	...	1·25	...	Genuine	Hodges & Co., Winnipeg.
8·97	...	1·32	...	"	W. R. Johnson "
9·03	...	1·33	...	"	F. E. Weldon & Co. "
10·84	...	1·37	...	"	Hunter, Kyle & Co. "
7·58	...	1·55	...	"	Kenneth McKenzie & Co., Winnipeg.
10·40	...	1·28	...	"	" "
6·15	...	1·30	...	"	E. Nicholson, Winnipeg.
0·43	...	1·42	...	Adulterated. A solid cheese-like substance which will not mix with hot water. Made from skim milk.	A. Macdonald "

APPENDIX A.—INSPECTION OF

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of					
					Specific Gravity.	Water.	Cane Sugar.	Reducing Sugar as Lactose.	Total Ash.	Casein.
1899.		*Official Analyst, Dr. C. J. Fagan, Victoria, B.C.*				p. c.	p. c.	p. c.	p. c.	p. c.
July	21	"Owl," Canada Milk Condensing Co. ..	15033	20126	1·0523	42 06	31·50	9·29	..	6·87
"	21	"Imperial," Baldwin Mill Condensing Co	15034	20127	1·0509	44·56	31·50	12·10	....	6·46
"	21	"Canadian" " "	15035	20128	1·0515	40·50	29·95	10·12		6·56
"	21	"Clover"	15036	20130	1·0551	34·50	40·89	9·36	...	8·75
"	21	"Milkmaid," Anglo-Swiss Condensed Milk Co.	15037	20131	1·0557	36·50	29·88	13·83	.....	8·89
"	21	"Crescent" (Condensed Cream), Pacific Creamery Co., California.	15038	20135	1·0222	78·63	0 00	9·55	....	7·03
"	21	"Reindeer," Truro Condensed Mi k Co...	15039	20136	1·0533	39·50	37·77	11·30	.....	1·46
"	21	"Jersey Cream" " ..	15040	20140	1·0253	75 50	0·25	10·93	...	7·36

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CONDENSED MILK—Tabulated Statement—*Concluded.*

Analysis. Total Fat.	Concentration (volume).	Nitrogen.	Total Solids.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.		p. c.	p. c.		
7·30					Blanchfield & Co., Vancouver, B.C
6·06					C. A. Ingram " "
8·12					Ford & Rogerson " "
8·62					Swait, Anderson, Bell & Co. "
8·62					G. W. Halliday. "
7·16					Parnell & Gunn, New Westminster, B.C.
7·38					Geo. Adams "
7·12					T. S. Annandale "

APPENDIX B.—INSPECTION OF CLOVES

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis. Moisture.	Oil. Volatile.	Oil. Non-volatile, Pet.: Ether Extract.	Oil. Fixed.
1899.	*Official Analyst, M. Bowman, Halifax.*			p. c.	p. c.	p. c.	p. c.
Sept. 6	Ground; imported	12740	17677	10 72	14·48	....	....
" 6	" "	12741	17678	10·58	13 72	.	....
" 12	Whole "	12742	17680	11 05	19·63	..	....
" 14	Ground; T. B. Barker & Son, St. John, N.B.	12743	17682	10·07	12·19	....	....
" 14	" A. F. Bandolph & Co., Fredericton, N.B.	12744	17683	10·89	19·32	.	..
" 7	Whole; Bowman & Angevine, St. John, N.B.	12745	16733	10·95	15·56	..	....
" 8	Ground; not known	12746	16736	11·22	12·00	....	....
" 11	Whole; W. H. Schwartz & Son, Halifax, N.S.	12747	16738	11·80	16·89	....	....
" 11	Ground " "	12748	16739	10·75	11·32	..	.
" 12	Whole " "	12749	16742	15·21	10·69	....	....
	Official Analyst, Dr. M. Fiset, Quebec.						
" 12	Whole	10180	19596	7·35	11·15	....	6·05
" 12	Ground; M. Lefebvre & Co., Montreal	10181	19597	7·30	11·65	..	6·95
" 12	" Pure Gold Co	10182	19598	5·85	14·00	....	6·36
" 12	" "	10183	19599	10·10	11·55	....	6·90
" 12	Whole	10184	19600	5·05	15·70	....	6·90
" 12	Ground	10185	19601	6·00	14·00	....	5·40
" 12	"	10186	19602	5·40	17 55	....	6·70
" 12	Whole	10187	19603	8·20	15·25	....	7·95
" 12	" Birks, Corner & Co., Montreal	10188	19604	8·05	12·90	....	7·30
" 12	Ground " "	10189	19605	7·60	7.50	....	7·20
	Official Analyst, Dr. J. B. Edwards, Montreal.						
" 6	Ground	15637	19575	9·34	8·32		....
" 6	"	15638	19576	6·68	14·71	...	....
" 6	Whole	15639	19577	9·95	9·35	....	....
" 7	Ground; Marrotte & Leblanc	15640	19578	10·98	5·27	...	....
" 7	Whole " "	15641	19579	10·99	8·51	....	....
" 22	" H. M. Dinning, Montreal	15650	19582	10 68	15·02	...	....
" 20	"	15648	19580	10·08	16·00	....	....
Oct. 5	" S. H. & A. S. Ewing, Montreal	15651	19583	8·62	15·03	..	....
" 5	"	15652	19584	8·31	14·74	...	...
" 5	Ground	15653	19585	12·09	7·13	....	....
" 5	"	15654	19586	9·69	11·03	....	....
	Official Analyst, Prof. E. B. Kenrick, Winnipeg.						
Sept. 25	Whole	11327	17193	5·73	18·29	2·99	....
" 25	Ground	11328	17194	6·28	3·24	6·92	...
" 25	" The A. Macdonald Co., Winnipeg	11329	17195	6·32	15·33	3·31	...
" 25	Whole " "	11330	17196	6·76	16·95	2·93	..
" 25	Ground; Hamilton Spice and Coffee Co	11331	17197	6·34	11·42	3·35	....
" 26	" not known	11332	17198	6·70	11·32	3·27	....
" 26	Whole; Sutherland & Campbell, Winnipeg	11333	17199	5·91	17 34	3·08	....
" 26	Ground; G. F. & J. Galt, Winnipeg	11334	17200	5·82	11·70	3·23	...
....	Whole; Codville Co., Winnipeg	11335	17201	6 39	17·86	2·97	...
Sept. 26	" Dyson, Gibson Co., Winnipeg	11336	17202	6·73	16·85	2 86	....

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(Whole and Ground)—Tabulated Statement.

Fat.	Ash.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.		
....	6·83	Genuine	Canada Drug Co., St. John, N.B.
. .	6·49	Deficient in volatile oil	Bowman & Angevine "
.....	6·38	Genuine	H. McKenna, St. Stephen, N.B.
....	6·52	Deficient in volatile oil	W. R. Logan, Fredericton, N.B.
.....	5·71	Genuine	John Gibson & Son "
......	7·12	"	R. R. Bishop, Kentville, N.S.
......	6·76	Deficient in volatile oil	Kirkpatrick & Dernont, Windsor, N.S.
....	6·02	Genuine	W. E. Crowe & Co., Halifax.
...	6·37	Deficient in volatile oil	A. M. Boutilier & Co. "
....	6·26	" "	W. H. Drake "
.. ...	6·62	Found no foreign tissues, but sample contains some stems and dirt.	A. A. Cantin, Quebec.
......	6·36	Adulterated with allspice	" "
......	6·10	Genuine	W. Treggett "
.....	6·00	"	" "
......	5·62	"	Fortier & Corriveau, Quebec.
......	5·98	Some wheat starch present; adulterated slightly	J. A. Moisan "
.. ...	6·40	Genuine	J. Picard "
......	5·80	"	J. P. Guy "
.....	5·96	"	K. McRae, Richmond, Que.
..	5·82	Adulterated, much fibrous tissue and some stone cells present, probably from clove stems.	" "
2·03	7·06	Adulterated by removal of volatile oil and excess of moisture.	A. Sarazin, Montreal.
0·94	7·00	Genuine	Labrecque & Leclair, Montreal.
1·26	5·85	"	" "
3·73	8·85	Adulterated as being deficient in volatile oil, containing sand and millings and excess of moisture.	O. Voisard "
1·99	7·42	Genuine, but of low quality; moisture in excess.	" "
1·85	5·90	Genuine	J. Beaudoin "
2·55	6·60	"	J. Brodeur, St. Hyacinthe, Que.
2·78	6·99	"	A. A. Perry, Westmount, Que.
2·04	6·71	" clove stalks numerous	C. Morrison "
2·11	8·33	Contains foreign tissue, pimento, deal splinters, wheat straw and mustard husk; adulterated to the extent of 20 p.c. and upwards.	" "
1·61	5·84	Genuine	A. A. Perry "
.....	6·16	Genuine; contains 3·75 p.c. of stems	D. M. Sutherland, Boissevain, Man.
......	4·09	Adulterated; sample appears to consist mainly or wholly of pimento.	" "
.....	5·69	Adulterated, being deficient in essential oil	John White "
.....	6·27	" sample contains 7·36 p.c. of stems	Hunter & Moore "
.. ..	7·12	" being deficient in essential oil	" "
.....	6·89	" " "	E. Nicol & Son "
... .	6·22	Genuine; sample contains 1·38 p.c. of stems	A. Embree "
..	6·66	Adulterated, probably with stems; deficient in essential oil.	John Wootton, Manitou, Man.
....	5·71	Genuine; sample contains 2·39 p.c. of stems	P. Winram, Manitou, Man.
......	6·38	Adulterated; sample contains 9·27 p.c. of stems	The Manitou Farmers' Store Co., Manitou, Man.

APPENDIX B.—INSPECTION OF CLOVES

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.			
				Moisture.	Oil.		
					Volatile.	Non-volatile. Pet.: Ether Extract.	Fixed.
1899.	*Official Analyst, Dr. C. J. Fagan, Victoria, B.C.*			p. c.	p. c.	p. c.	p. c.
Sept. 12	Ground ; Todhunter & Mitchell, Toronto	15049	20141	5·60	4·04	.....	9·26
" 12	"	15050	20142	6·20	10·05	......	7·62
" 12	" Snowdrift Co., Brantford, Ont	15051	20145	8·10	2·90	...	11·82
" 12	Whole	15052	20148	6·30	12·78	....	10·23
" 12	Ground	15053	20150	7·10	9·24	......	9·08
" 12	Whole	15054	20151	8·42	11·16	....	9·16
" 12	"	15055	20154	8·36	13·00	....	9·12
" 12	"	15056	20155	8·49	6·93	......	8·07

(Whole and Ground)—Tabulated Statement—*Concluded.*

Fat.	Ash.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.		
.....	6·04	Many starch granules; poor quality	Weeks & Robson, Vancouver, B.C.
.....	5·87	Very few starch granules; genuine	S. Cobb "
.....	7·37	Contains many stems and some starch granules; adulterated with stems and poor in quality.	Mrs. Stofford "
.....	6·91	Genuine	Geo. Hobson "
.....	5·03	" a few starch granules	T. S. Annandale, New Westminster, B.C.
.....	5·51	"	Geo. Adams " "
.....	5·99	"	T. S. Annandale " "
.....	4·96	Poor in quality	E. J. Rae " "

APPENDIX C.—INSPECTION OF SCOTCH

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Specific Gravity — Of Sample.	Specific Gravity — Of Distillate	Difference.	Fixed Matter, Grains per litre.	Result of — Alcohol. By Weight.	Alcohol. By Volume.
1899.		*Official Analyst, Dr. F. X. Valade, Ottawa.*							p. c.	p. c.
Aug.	29	Scotch whisky (Pure Malt), McLaren, Perth, Ont.	14620	18451	0·9299	0·9278	0·0021	9·424	45·64	53·52
"	29	Scotch whisky (Fine Old) Meagher, Bros. & Co., Montreal.	14621	18452	0·9554	0·9532	0·0022	0·305	32·78	39·36
"	29	Scotch whisky, Jno. Hope, agent, Montreal.	14622	18453	0·9335	0·9320	0·0015	3·387	43·71	51·34
"	29	Scotch whisky...	14623	18454	0·9415	0·9403	0·0012	4·35	39·65	46·96
"	29	Scotch whisky (Old Scotch), McMeen & Co., Glasgow, Scotland.	14624	18455	0·9468	0·9447	0·0021	1·28	37·28	44·36
"	31	Scotch whisky (Fine), McAlpine & Co., Glasgow, Scotland.	14625	18456	0·9445	0·9442	0·0023	1·14	38·67	45·89
"	31	Scotch whisky (Heather), Mitchell Bros., Glasgow, Scotland.	14626	18457	0·9361	0·9345	0·0016	1·74	42·52	50·06
"	31	Scotch whisky, Thom & Cameron, Glasgow, Scotland.	14627	18458	0·9323	0·9301	0·0022	0·772	45·59	52·26
"	31	Scotch whisky, Spalding & Stewart, Perth, Ont.	13628	18459	0·9313	0·9305	0·0008	0·949	44·44	52·08
		Official Analyst, F. T. Harrison, London, Ont.								
	22	Scotch whisky, H. Corby, Belleville, Ont.	14119	19277	0·9094	0·9087	0·0007	0·940	54·10	61·98
"	22	Scotch whisky (Glenlivet), Andrew Usher & Co,, Edinburgh, Scot.	14120	19278	0·9361	0·9358	0·0003	1·070	41·88	49·40
"	22	Scotch whisky, Bullock, Laird & Co.	14121	19279	0·9333	0·9330	0·0003	1·250	43·22	50·82
"	23	Scotch whisky (Islay), J. & R. Harvey, Glasgow, Scotland.	14122	19280	0·9175	0·9160	0·0015	1·270	50·87	58·80
"	23	Scotch whisky (Mountain Dew), Spalding & Stewart, Perth, Ont.	14123	19281	0·9366	0·9361	0·0005	0·740	41·72	49·24
"	23	Scotch whisky, A. Stewart & Co., Glasgow, Scotland.	14124	19282	0·9346	0·9336	0·0013	0·250	42·95	50·54
"	23	Scotch whisky...	14125	19283	0·9393	0·9381	0·0012	0·876	40·71	48·16
"	23	Scotch whisky (Bonnie Doon) Hay, Fairman & Co., Glasgow, Scot.	14126	19284	0·9362	0·9355	0·0007	0·618	42·02	49·56
"	23	Scotch whisky (Four Stars) Donald & Co., Glasgow.	14127	19285	0·9419	0·9407	0·0012	0·600	39·39	46·75
		Official Analyst, Dr. W. H. Ellis, Toronto.								
"	28	Scotch whisky (Loch Carron) Graham, Davy & Co., Argyleshire, S.	12370	19286	0·9555	0·9541	0·596	.....	32·21	38·68
"	28	Scotch whisky (Colonsay), J. Turner & Co., Hamilton, Ont.	12371	19287	0·9180	0·9177	0·916	......	50·06	57·88
"	28	Scotch whisky (Mountain Dew), Spalding & Stewart, Perth, Ont.	12372	19288	0·9301	0·9290	0·249	...	45·07	52·72
"	28	Scotch whisky (Old Islay), Geo. Barnhardt, Galt, Ont.	12373	19289	0·9354	0·9341	0·450	......	42·72	50·26
"	28	Scotch whisky (The Clansman), J. Taylor & Co., Glasgow, Scotland.	12374	19290	0·9433	0·9432	0·624	.....	38·10	45·28
"	28	Scotch whisky, Howard & Sons, Toronto.	12375	19291	0·9521	0·9503	6·180	..	34·36	41·16
"	28	Scotch whisky (Bonnie Doon), Hay, Fairman & Co., Glasgow, Scot.	12376	19292	0·9366	0·9366	0·644	....	41·49	48·97
"	38	Scotch whisky (Benmore), McRae, Ross & Co., Glasgow.	12377	19293	0·9430	0·9424	1·076	.. .	38·58	45·77
"	28	Scotch whisky, (Extra Special), J. Dewar & Son, Perth, Scotland.	12378	19294	0·9388	0·9378	0·912	.. ...	40·89	48·32
"	28	Scotch whisky (Clenaskit)...	12379	19295	0·9396	0·9406	1·164	....	39·50	46·80

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WHISKEY—Tabulated Statement.

Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
Proof Spirit.	Opalescence on Diluting 1 to 2	Furfurol.	Acetone		
p. c.					
93·48	Distinct . .	Distinct . . .	None. . .	Genuine	Kennedy & Co., Ottawa.
68·98	None.	"	" . . .	Probably an imitation article.	" "
89·95	Slight	Faint.	" . . .	" " . .	G. Lebel "
82·31	"	"	" . . .	" " . .	T. Martin "
77·75	None.	"	" . . .	" " . .	A. Beaudet "
80·43	"	"	" . . .	" " . .	S. Lochnan, Aylmer, Que.
87·73	Slight	"	" . . .	" " . .	D. A. Decosse & Cie, Hull, Que.
91·56	"	"	" . . .	" " . .	Cameron & McDonald, Cornwall.
91·27	Distinct	Distinct . . .	" . . .	Genuine	John Duffy, Cornwall.
108·62	Distinct	Very distinct. .	None. . .	Contains no added injurious substance.	E. Dawson, Seaforth, Ont.
86·56	Slight	Distinct	" . . .	" " . .	W. W. Saults, Goderich, Ont.
89·06	"	" . .	" . . .	" " . .	Geo. Broxton "
103·05	Distinct	Very distinct. .	" . . .	" " . .	Thos. Quirk, Stratford, Ont.
86·29	"	Distinct . . .	" . . .	" " . .	Walsh Bros. "
88·56	"	"	" . . .	" " . .	A. Beattie & Co., St. Mary's, Ont.
84·39	Fairly distinct	"	" . . .	" " . .	Whelian Bros. "
86·85	None or very slight trace.	Faint.	" . . .	" " . .	John Gavey, Dundas, Ont.
81·93	None.	Very faint. . . .	. . . .	Probably largely patent still spirit. Contains no added injurious substance.	Jas. Wilson, London, Ont.
67·80	Clear.	Faint.	None. . .	Unadulterated	A. McIntyre, Woodstock, Ont.
101·43	Faint.	"	" . .	. . . .	J. D. McKenzie "
92·40	Distinct	"	" . . .	"	J. H. Ahrens, Paris, Ont.
88·09	Clear.	"	" . . .	"	J. Ealand "
79·36	"	"	" . . .	"	P. & R. Laing, Dundas, Ont.
72·13	"	"	" . . .	"	H. C. Gifford, Brampton, Ont.
85·81	"	"	" . . .	"	T. K. Haffey, Toronto.
80·21	"	"	" . . .	"	C. J. Kidd "
84·68	Slight	"	" . . .	"	M. Lawyer "
82·02	Faint.	. . . .	" . . .	"	J. D. Lea & Co. "

APPENDIX D.—INSPECTION OF PEPPER

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of: Moisture.	Loss by Extraction with Alcohol of 0·815 Sp. Gr.	Extract by Evaporation.	Volatile Matter in Extract.
1899.		*Official Analyst, M. Bowman, Halifax, N.S.*			p. c.	p. c.	p. c.	p. c.
Nov.	10	White ; Simpson Bros., Halifax, N.S.	12755	16744	10·45	....	......	......
"	10	Black ; J. P. Mott & Co., Halifax, N.S.	12756	16745	9·39	.....	13·71	..
"	14	" W. H. Schwartz & Sons, Halifax, N.S.	12757	16746	9·13	.....	13·95	...
"	14	White ; J. P. Mott & Co., Halifax, N.S.	12758	16747	10·55	.....	9 24	...
"	14	" W. H. Schwartz & Sons, Halifax, N.S.	12759	16748	10·50	.....	9·40	.....
"	6	" C. & E. McMichael, St. John, N.B.	12750	17684	10·19	..	8·91	.....
"	6	" imported by vendors	12751	17685	9·93	....	9 08	....
"	6	Black ; T. B. Barker & Sons, St. John, N.B.	12752	17686	8·88	...	7·72	.....
"	6	" W. G. Dunn & Co., Hamilton, Ont.	12753	17687	9·11	.....	13·09	......
"	7	" Dearborn & Co., St. John, N.B.	12754	17688	9·15	.....	14·52	.....
		Official Analyst, Dr. M. Fiset, Quebec.						
Nov.	8	White ; S. H. Ewing & Sons, Montreal	10190	19629	11·30	8·05	8·25	.....
"	8	Black	10191	19630	12·20	12·15	12·20	......
"	8	White ; Langlois & Paradis, Quebec	10192	19631	12·10	9·20	9·25	......
"	8	Black " "	10193	19632	11·18	11·25	11·20	..
"	8	"	10194	19633	10·77	7·60	7·70	.....
"	8	White	10195	19634	10·85	4·80	4·87	......
"	22	" Pure Gold Manufacturing Co., Toronto	10196	19635	11·73	9·10	9·20	....
"	22	Black	10197	19636	10·38	13·77	13·60	....
"	22	"	10198	19638	9·45	13·55	11·55	2·00
"	22	White	10199	19638	12·05	9·27	8·55	0·72
		Official Analyst, Dr. J. B. Edwards, Montreal.						
Oct.	27	White ; Marrotte & Leblanc, Montreal	15655	19607	13·98	8·82	8·02	0·80
"	27	Black " "	15656	19608	14·13	10·64	10·60	0·04
"	30	White " "	15657	19609	14·21	8·58	8·28	0·30
"	30	" R. Herron & Co.	15658	19610	14·92	3·86	3·75	0·11
"	30	Black "	15659	19611	11·09	12·89	8·07	4·82
"	31	White	15660	19612	11·53	7·97	6 42	1·55
"	31	Black	15661	19613	10·69	12·67	9·98	2·69
"	31	" Laporte, Martin & Co	15662	19614	13·06	9·87	8·80	1·07
Nov.	2	White ; S. J. Major, Ottawa	15663	19615	14·38	7·29	7·05	0·24
"	2	Black	15664	19616	8.57	16·94	12·52	4·42
"	2	White	15665	19617	13·96	6·53	6·25	0·28
		Official Analyst, Dr. F. X. Valade, Ottawa.						
Oct.	31	White	14638	18480	11·03	21·18	9·91	....
"	31	" Bate & Co., Ottawa	14639	18481	11·96	18·55	7·40	...
"	31	"	14640	18482	9·17	18·78	7·54	...
"	31	" Pure Gold Manufacturing Co., Toronto	14641	18483	11·53	19·12	8·54	....
"	31	"	14642	18484	11·73	27·35	7·24	.....
"	31	Black ; Pure Gold Manufacturing Co.	14643	18485	10·21	21·65	11·35	....

(Black and White)—Tabulated Statement.

Analysis. Ash. Total.	Soluble in Water.	Insoluble in Water.	Insoluble in Acid.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.	p. c.	p. c.		
4·58	0·18	4·40	0·45	Genuine..............................	Wood & Murphy, Windsor, N.S.
5·11	2·49	2·62	0·51	"	Shand Bros. "
6·80	2·88	3·92	0·89	"	N. Cornfoot, Halifax, N.S.
3·55	0·29	3·26	0·33	"	W. C. Anderson "
4·17	0·37	3·80	0·22	"	J. A. Leaman & Co. "
3·33	0·32	3·01	0·38	"	J. F. Vanwart, St. John, N.B.
3·44	0·27	3·17	0·63	"	Puddington & Merritt "
12·90	2·45	10·45	6·65	Adulterated with wheat starch and contains also a large amount of sand.	M. J. Rankine "
5·45	2·33	3·12	0·85	Genuine..............................	G. M. & A. A. Barker "
5·34	3·17	2·17	0·24	"	R. McConnell "
2·96	0·70	2·26	0·36	Genuine..............................	Duplain & Pagnet, Quebec.
5·56	2·00	3·56	1·04	"	" "
2·58	0·60	1·98	0·32	"	G. Turcotte "
3·76	2·08	1·68	0·20	"	" "
4·82	1·44	3·38	1·26	Rice starch and cayenne present, also some unidentified tissue; adulterated.	M. Blouin & Co. "
2·08	0·82	1·26	0·14	Wheat and rice starches, cayenne, fibrous tissues present; adulterated.	" "
1·04	0·26	0·78	0·18	Genuine..............................	S. Bechand & Son, Coaticook, Que.
7·36	2·42	4·94	0·74	Cocoanut shell present; adulterated......	" "
5·06	2·32	2·74	0·88	" "	J. P. Durand "
3·08	0·68	2·40	0·34	Genuine..............................	" "
2·33	1·33	1·00	0·14	Genuine..............................	J. B. Vanier, Montreal.
6·03	3·40	2·63	0·51	Contains roasted peas and maize and millings; adulterated to the extent of 10 to 15 p. c.	P. Dufour "
2·51	1·14	1·37	0·32	Genuine..............................	G. Brenner "
2·26	0·77	1·49	0·17	Contains wheat flour, maize, pea flour, mustard husks and turmeric; adulterated to the extent of from 30 to 40 p. c.	J. Lauder "
16·13	6·06	10·17	4·92	" " ..	" "
2·31	0·60	1·71	0·27	Genuine..............................	Leduc et Frère, Valleyfield, Que.
5·99	3·54	2·45	0·56	Contains mustard husk, capsicum and maize starch; adulterated from 5 to 10 p. c.	" "
7·27	1·89	5·38	2·00	Contains wheat flour and maize, cayenne, and mustard husks and millings; adulterated to the extent of 30 to 40 p. c.	L. A. Trempe "
6·88	0·44	6·44	0·26	Genuine..............................	P. Daoust, Hull, Que.
6·52	2·24	4·28	0·80	"	" "
6·40	3·63	2·77	0·38	Contains pea flour, maize and millings; adulterated to the extent of 5 to 10 p. c.	A. Gagnon "
2·46	1·40	1·06	0·02	Genuine..............................	Morrison & Morrison, Ottawa.
3·50	0·29	3·21	0·40	"	Wall & Co. "
4·08	0·91	3·17	0·78	From 2 to 5 p. c. wheat starch; and olive shells; adulterated.	Miles Slattery "
1·70	0·16	1·54	0·20	Genuine..............................	A. E. Cowan "
3·33	0·26	3·07	0·34	About 5 p. c. olive stone; adulterated....	A. C. Goulet, Rochesterville, Ont.
4·22	1·71	2·51	1·26	Genuine..............................	A. E. Cowan, Ottawa.

APPENDIX D.—INSPECTION OF PEPPER

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of: Moisture.	Loss by Extraction with Alcohol of 0·817 Sp. Gr.	Extract by Evaporation.	Volatile Matter in Extract.
1899.	*Official Analyst, Dr. F. X. Valade, Ottawa*—Con.			p. c.	p. c.	p. c.	p. c.
Oct. 31	Black; S. J. Major	14644	18486	11·10	21·68	7·43	....
" 31	" Hamilton Coffee and Spice Co.	14645	18487	10·96	22·47	10·44	..
" 31	" Bate & Sons, Ottawa	14646	18488	9·87	19·78	9·47	....
	Official Analyst, Dr. W. H. Ellis, Toronto.						
Nov. 10	White (compound)	12390	18360	11·01	6·33	7·01	....
" 10	" Pure Gold Mfg. Co., Toronto	12391	18361	11·16	7·31	8·50	....
" 11	" Todhunter & Mitchell, Toronto	12392	18362	12·08	7·69	8·35	....
" 11	" " " "	12393	18363	10·33	7·63	9·25	....
" 11	"	12394	18364	9·35	9·70	12·73	....
" 10	Black; Pure Gold Mfg. Co.	12395	18365	9·85	13·12	15·55	....
" 10	" Todhunter & Mitchell	12396	18366	10·49	9·00	10·50	....
" 10	" Hamilton Spice Co.	12397	18367	9·35	10·28	11·60	....
" 10	" Todhunter & Mitchell	12398	18368	9·20	7·76	9·70	....
" 10	" (compound)	12399	18369	9·83	8·50	8·70	....
	Official Analyst, W. H. Harrison, London, Ont.						
Oct. 14	White; J. Turner & Co., Hamilton	14139	19305	9·30	....	....	....
" 14	" Todhunter & Mitchell	14140	19306	10·00	....	....	....
" 16	" Macpherson, Glassco & Co., Hamilton	14141	19307	9·75	....	....	....
" 16	" Hamilton Coffee and Spice Company	14142	19308	9·65	....	....	....
" 17	" Snow Drift Baking Powder Co., Brantford, Ont.	14143	19310	10·30	....	....	....
" 17	" Hamilton Coffee and Spice Company	14144	19311	10·65	....	....	....
" 18	" J. M. Mayell & Co., London, Ont.	14145	19312	9·65	....	....	....
" 18	" Gorman & Eckhart, London, Ont.	14146	19313	7·85	Principally,		
" 18	" " " "	14147	19314	8·25	gypsum		
	Official Analyst, Prof. E. B. Kenrick, Winnipeg.						
Nov. 20	White; Todhunter & Mitchell, Toronto	11337	17203	11·22	6·42	....	None.
" 20	Black; H. A. O. Ewing, Montreal	11338	17204	11·20	8·77	....	"
" 20	White; Todhunter & Mitchell, Toronto	11339	17205	11·85	6·75	....	"
" 22	Black; Dyson, Gibson & Co., Winnipeg	11340	17206	8·63	10·12	....	"
" 22	White; G. F. & J. Galt, Winnipeg	11341	17217	10·87	5·20	....	"
" 22	Black; Balfour & Co., Hamilton	11342	17218	11·83	9·10	....	"
" 23	" Lucas, Steele & Bristol, Hamilton	11343	17219	10·03	7·78	....	"
" 23	White; Todhunter & Mitchell, Toronto	11344	17220	12·24	6·65	....	"
" 23	" W. G. Dunn, Hamilton	11345	17221	11·46	5·44	....	....
" 23	Black; Hamilton Coffee and Spice Company	11346	17222	11·12	10·43	..	....
	Official Analyst, Dr. C. J. Fagan, Victoria, B.C.						
" 23	White; Pure Gold Mfg. Co., Toronto	15057	20157	13·91	20·59	10·47	10·12
" 23	"	15058	20158	13·57	14·95	6·33	8·62
" 23	"	15059	20159	14·72	19·82	8·77	11·05
" 23	Black	15060	20160	11·70	23·14	15·56	7·45
" 23	" B. C. Canning Co., Vancouver	15061	20161	13·40	18·98	9·38	9·60
" 24	"	15062	20165	13·52	22·51	11·41	11·10
" 24	White	15063	20166	14·16	21·27	9·71	11·56
" 24	Black; Todhunter, Mitchell & Co., Toronto	15064	20167	42·70	19·67	9·93	9·74

(Black and White)—Tabulated Statement.

Analysis. Ash. Total.	Soluble in Water.	Insoluble in Water.	Insoluble in Acid.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.	p. c.	p. c.		
9·41	1·95	7·46	3·82	Wheat, corn and bean starches, and olive stone cells; adulterated.	A. Barbe, Rochesterville, Ont.
4·36	2·37	1·99	0·12	Genuine......	S. Stitt "
4·55	1·23	3·32	0·80	Rice in large quantity, olive stone cells; potato and corn starches; adulterated.	J. Evans "
1·65	0·35	1·30	0·15	A mixture of white pepper and farinaceous matter.	W. H. Wrighton, Peterboro', Ont.
3·05	0·80	2·25	0·30	Genuine......	E. Brown & Co. "
2·05	0·60	1·50	0·30	"	J. O. Carpenter, Hamilton, Ont.
2·35	0·35	2·00	0·35	"	H. Lindsay, Toronto.
3·85	0·95	2·90	0·30	"	W. Laing "
4·90	1·60	3·30	0·80	"	E. Brown & Co., Peterboro', Ont.
5·15	1·25	3·90	1·15	"	J. O. Carpenter, Hamilton, Ont.
4·20	1·80	2·40	0·55	"	J. J. McQuarrie "
5·25	1·55	3·70	0·95	"	H. Lindsay, Toronto, Ont.
7·70	1·45	6·25	2·15	Various vegetable matters other than pepper.	W. Laing "
1·35	0·15	1·20	0·20	Genuine......	Peter Dill, Seaforth, Ont.
2·47	0·35	2·12	0·25	"	Andrew Young "
1·50	0·30	1·20	0·15	Adulterated by addition of rice flour.....	F. Davis, Mitchell, Ont.
1·57	0·22	1·35	0·35	Genuine	W. J. Levy "
1·97	0·47	1·50	0·20	Adulterated by addition of wheat flour...	John Walker, Paris, Ont.
4·75	2·30	2·45	0·42	Shows a little wheat starch; slightly adulterated.	D. Shephard "
4·50	1·15	3·35	0·45	Genuine......	R. H. Cullis, London, Ont.
16·35	14·65	1·70	0·17	Adulterated with gypsum and flour and ground biscuit.	F. Harding "
16·03	14·45	1·58	0·17	" " ..	F. H. Robinson "
1·27	0·26	1·01	0·12	Genuine......	A. F. Calder, Winnipeg.
4·90	1·71	3·19	1·24	"	J. L. Wells & Co. "
2·17	0·27	1·90	0·33	"	W. L. Capell "
6·68	1·85	4·83	1·56	"	J. Liven "
2·43	0·31	2·12	0·19	"	W. M. Crawford, Indian Head, Man.
4·40	2·27	2·13	0·45	"	E. J. Brooks & Co. "
8·75	1·82	6·93	2·97	Adulterated with wheat starch......	R. H. Benson & Co. "
2·12	0.24	1·88	0·31	Genuine......	W. J. Young, Brandon, Man.
2·71	0·32	2·39	0·23	"	Smith & Burton "
4·68	2·25	2·43	0·58	"	J. Symington "
3·76	0·58	3·18	0·64	Genuine......	J. F. May, Vancouver, B.C.
1·84	0·58	1·26	0·43	"	B. B. Brown "
1·54	0·84	0·70	0·28	"	C. Mowatt "
8·22	6·37	1·85	0·36	"	M. MacTaggart "
6·19	2·11	4·08	1·30	Adulterated with starch......	Mrs. K. Fleming "
5·04	3·77	1·27	0·20	Genuine......	C. McDonough, N. Westmin'r, B.C.
1·14	0·19	0·95	0·21	"	McKenzie & Bros. "
6·38	4·11	5·72	0·66	"	Parnett & Grumm "

APPENDIX E.—INSPECTION OF CANADIAN

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of: Specific Gravity. Of the Wine.	Specific Gravity. Dealcoholized Wine.	Alcohol in 100cc. By Wt.	Alcohol in 100cc. By Vol.	Alcohol in 100cc. Proof Spirit.	Total Solids in 100 cc.	Reducing Sugar as Dextrose.
1899.	*Official Analyst, M. Bowman, Halifax, N.S.*					p. c.	p. c.	p. c.	p. c.	p. c.
	Brand.									
Nov. 8	"St. Augustine," Pelee Island Wine Company.	12762	17689	1·0436	1·0602	9·38	12·34	21·62	13·34	11·95
" 8	"S. Port," St. David's Vine Growers Co., Toronto.	12763	17690	1·0432	1·0576	9·57	12·58	22·06	14·06	12·17
" 8	"Special Old Sherry," Ontario Wine Mfg. Co., St. Catharines, Ont.	12764	17691	1·0110	1·0298	12·16	15·49	27·65	6·59	4·62
" 14	"Golden Diana" " " ..	12765	17692	1·0508	1·0672	10·42	13·81	24·19	15·87	13·28
" 17	"Niagara Sweet Catawba," T. G. Bright & Co., Toronto.	12766	17693	1·0387	1·0520	10·30	13·56	23·78	12·60	11·70
" 9	"Imperial," St. David's Vine Growers' Co., Toronto.	12767	16749	1·0366	1·0515	10·07	13·15	23·04	11·32	11·04
" 13	"Port" " " ..	12768	16750	1·0189	1·0380	11·99	15·40	26·99	8·06	6·53
" 13	"Catawba," T. G. Bright & Co., Toronto.	12769	16751	1·0179	1·0362	12·44	15 96	27·97	8 25	7·51
" 13	"Catawba," Pelee Isl'd Wine Co.	12770	16752	1·0498	1·0627	8·91	11·79	20·65	14·72	14·20
" 13	"Double Diamond Port," St. David's Vine Growers' Co.	12771	16753	1·0426	1·0606	9·65	12·08	22·22	13·37	12·33
	Official Analyst, Dr. M. Fiset, Quebec.									
" 8	Ontario Grape Growing Co. of St. Catharines, Ont.	13601	19639	1·05581	1·07159	10·81	13·39	23·45	16.29	16·71
" 8	G. Bright & Co., Niagara Falls.	13602	19640	1·03386	1·05121	11·37	14·08	24·67	11·02	11·68
" 8	"Golden Diana,' Ontario Wine Mfg. Co., St. Catharines.	13603	19641	1·05924	1·07610	11·23	13·90	24·36	17·20	17·10
" 8	Ontario Wine Mfg. Co., St. Catharines.	13604	19642	1·02942	1·04783	12·05	14·88	26·09	10 83	10·69
" 8	St. David's Wine Co..........	13605	19643	1·03647	1·05337	10·89	13·48	23·62	12·04	12·00
" 22	Vendor	13606	19644	1·01957	1·03388	8·95	11·10	19·45	7·26	6·90
" 22	.. ..	13607	19645	1·04548	1·06157	10·82	13·39	23·47	13·90	14·04
" 22	....	13608	19646	1·03628	1·05301	10·08	12·49	21·89	11·80	12·24
" 22	Canada Liquor Co., Montreal.	13609	19647	1·03925	1·05592	10·17	12·60	22·10	11·88	12·00
" 22	" " ..	13610	19648	1·00825	1·02647	11·89	14·70	25·75	5·68	4·34
	Official Analyst, Dr. J. B. Edwards, Montreal.									
Oct. 28	St. David's Wine Co., Toronto	15666	19618	1·0357	1·0488	10·46	12·96	22·47	12·87	7·47
" 30	Ontario Grape Growing and Wine Co.	15668	19619	1·0388	1·0530	10·85	13·43	23·47	13·70	9·91
" 30	....	15669	19620	1·0453	1·0587	10·85	13·43	23·47	14·74	10·58
Nov. 2	St. David's Wine Co.........	15670	19621	1.0327	1·0500	12·38	15·30	26·82	12·77	10·10
" 2	" "	15671	19622	1·0280	1·0306	11.38	14·09	24·68	14·10	8·98
" 9	....	15672	19623	1·0420	1·0567	11·15	13·81	24·20	17·92	11·19
" 9	Niagara Falls Wine Co. .. .	15673	19624	1·0068	1·0246	11.62	14·37	25·17	7·10	3·87

NATIVE WINES—Tabulated Statement.

ANALYSIS.						Remarks by Analyst.	Name and Address of Vendor of Sample.
	Acidity in 100 cc.						
Polarisation.	Total as Tart. Acid.	Fixed as Tart. Acid.	Volatile as Acetic Acid.	Ash.	Colour and Clearness.		
	p. c.	p. c.	p. c.	p. c.			
— 15·40	0·736	0·414	0·257	. . .	Red, clear....	Not genuine, foreign sugar having been added	E. G. Scovil, St. John, N.B.
— 4·11	0·651	0·411	0·192	...	〃	〃 〃 ..	R. Sullivan & Co. 〃
— 8·55	0·658	0·496	0·130	.....	Sherry colour, clear.	Alcohol having been added.	McIntyre & Comeau 〃
— 37·2	0·985	0·697	0·230	.	〃 ..	Foreign sugar added...	Norman McDonald, Fredericton, N.B.
— 29·41	0·573	0·387	0·149	......	Slightly pink, clear.	〃 ...	T. H. Haley, St. John, N.B.
— 32·34	0·713	0·403	0·248	...	Sherry colour, muddy.	〃 ...	W. Poole, Windsor, N.S.
— 18·90	0·984	0·604	0·304	...	Red, clear....	Alcohol added.... ..	Kelley & Glassey, Halifax.
— 22·00	0·612	0·395	0·173	.....	Sherry, clear..	〃	〃 〃
— 19·38	0·844	0·457	0·309	.....	〃 ..	Foreign sugar added...	J. Scott & Co. 〃
— 3·08	0·589	0·372	0·173	....	Red, clear ...	〃 ...	T. F. Courtney & Co. 〃
....	0·694	0·451	0·197	0·208	Dk. claret, clear.	Foreign sugar used...	H. A. Pare, Quebec.
....	0·750	0·577	0·143	0·184	〃 .	〃	P. L. Turgeon 〃
....	0·817	0·542	0·215	0·144	Golden red, pretty clear.	〃	A. Grenier 〃
....	0.781	0·456	0·255	0·172	Dk claret, clear.	Foreign sugar used and perhaps alcohol.	〃 〃
....	0·657	0·340	0·251	0·164	〃 ..	Foreign sugar used....	Dion & Frère 〃
....	0·449	0·272	0·137	0·080	Magenta, not very clear.	Effervescence on opening bottle; ash too low; foreign sugar used, and perhaps water added.	V. Paradis, Coaticook, Q.
....	0·638	0·460	0·221	0·192	Dk claret, clear.	Foreign sugar used ...	P. Oliver, Sherbrooke, Q.
....	0·706	0·329	0·307	0·192	Dk cherry, cl'r.	〃	L. H. Guay 〃
....	0·741	0·360	0·304	0·188	〃 ..	〃	E. M. Blanchard 〃
....	0·843	0·394	0·358	0·208	〃 ..	Foreign sugar probably used.	F. R. Darche 〃
....	0·611	0·563	0·038	0·13	Ruby, clear...	Adulterated by the addition of cane sugar.	J. Laurin, Montreal.
....	0·740	0·631	0·087	0·22	Purple to brown, clear.	〃 〃 ..	G. Brenner 〃
....	0·869	0·815	0·038	0·25	Brownish purple, turbid.	〃 〃 ..	O. Voisard 〃
....	0·610	0·584	0·021	0·26	Ruby, vy. clear	〃 〃 ..	M. J. Laverdure, Hull, Q.
....	0·618	0·462	0·125	0·17	Tawny, clear..	〃 〃 ..	〃 〃
....	0·769	0·645	0·108	0·23	〃 .	〃 〃 ..	N. Dufresne, Three Rivers, Q.
....	0·924	0·835	0.071	0·27	〃 .	Alcohol added; no foreign sugar; adulteration doubtful.	Rivard & Frères 〃

APPENDIX E.—INSPECTION OF CANADIAN

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Specific Gravity: Of the Wine.	Specific Gravity: Dealcoholised Wine.	Result of — Alcohol in 100cc.: By Wt.	Alcohol in 100cc.: By Vol.	Alcohol in 100cc.: Of proof spirit.	Total Solids in 100 cc.	Reducing Sugar as Dextrose.
1899.		*Official Analyst, Dr. J. B. Edwards, Montreal* Con. Brand.					p. c.	p. c.	p. c.	p. c.	p. c.
Sept.	9	J. W. Lee & Co., Toronto ...	15674	19625	1·0339	1·0480	10·54	13·05	22·67	15·88	9·57
"	16	"St. Bernard," Trappists' Monastery, Oka, P.Q.	15675	19626	1·0189	1·0350	12·38	15·30	26·82	10·94	6·90
"	16	"St. Anne" " " ..	15676	19627	1·0216	1·0372	11 62	14·37	25·17	11·23	7·26
"	16	"Lorrette" " " .	15677	19628	1·0159	1·0324	12·31	15·21	26·16	10·30	6·68
		Official Analyst, Dr. F. X. Valade, Ottawa.									
Oct.	30	"Port," not known.	14647	18489	1·0235	1·0367	15·75	19·39	33·96	9·07	8·07
"	30	"Red" "	14648	18490	1·0408	1·0538	12·69	15·68	27·48	7·51	5·79
"	30	"Concord," Pelee Isl'd Wine Co	14649	18491	1·0467	1·0565	11·08	13·71	24·03	13·64	12 61
"	30	"St. Augustine" " " ..	14650	18492	1·0430	1·0618	11·69	14·46	25·34	12·68	11·60
"	31	"Catawba," St. David's W. Co	14651	18493	1·0220	1·0341	9·21	11·14	20·04	8·02	6·05
"	31	"Pure," Stamford Park W. Co	14652	18494	1·0335	1·0524	11·62	14·37	25·18	11·65	10·09
"	31	"4-yrs-old," Pelee Isl'd W. Co.	14653	18495	1·0394	1·0552	10·69	13·24	23·21	7·89	7·07
"	31	St. David's Wine Co...... ...	14654	18496	1·0324	1·0496	12·77	15·77	27·64	11·05	9·08
"	31	T. E. Bright & Co., Toronto..	14655	18497	1·0049	1·0260	14·45	17·81	31·22	5·88	4·69
		Official Analyst, Dr. W. H. Ellis, Toronto									
Nov.	10	"Sweet Catawba," Pelee Island Wine Co.	12401	18370	1·0347	1·0481	7·93	9·86	17·29	11·28	10·90
"	10	"St. David's Port," Lee & Co., St. Catharines.	12402	18371	1·0358	1·0509	9·23	11·44	20·44	12·46	9·84
"	10	"Catawba," Pelee Island Wine Co.	12403	18372	1·0239	1·0426	10·46	12·96	22·71	9·98	9.31
"	11	"Dry Catawba," The Hoskins Wine Co., Hamilton.	12404	18373	0·9897	1·0070	11·15	13·81	24·19	1·46	0·56
"	11	"Port," The Hoskins Wine Co., Hamilton.	12405	18374	1·0134	1·0348	13·62	16·80	29·43	7·68	7 26
"	11	"Sweet Catawba," Pelee Island Wine Co.	12406	18375	1 0400	1·0547	8·50	10·56	18·50	12·90	13·51
"	11	"Salem" Grimsby Wine Co .	12407	18376	1·0428	1·0610	11·23	13·90	24 36	14·20	13·95
"	11	"Port," St. Catharines Wine Co.	12408	18377	1·0416	1·0592	10·85	13·43	23·54	14·06	13·63
"	11	"Concord"	12409	18378	1·0289	1·0472	11·62	14 37	25 18	11·24	10·26
"	11	The Niagara Falls Wine Co .	12410	18379	1·0370	1·0556	11·38	14·09	24 69	13.06	12·18
		Official Analyst, F. T. Harrison, London, Ont.									
	2	The Hoskins Wine Co., Hamilton.	14148	19315	1·0495	1·0640	9·33	11·75	20 57	15·49	12·01
"	2	Pelee Island Wine Co..	14149	19316	1·0477	1·0614	9·46	11·91	20·88	15 02	12·33
"	2	Ontario Grape Wine Co., St. Catharines.	14150	19317	1 0339	1·0507	11 60	14·60	25·59	12·38	9·89
"	2	T. E. Bright & Co...... .	14151	19318	1·0350	1·0518	11·04	13·90	24·36	12·50	10·79
"	3	E. Girardot & Co., Sandwich, Ont.	14152	19319	1·0112	1·0300	12·34	15·53	27 23	7·01	5·26
"	3	John Finlay, Pelee Island ...	14153	19320	1 0290	1 0443	9·95	12 51	21.98	10·85	9·11

NATIVE WINES—Tabulated Statement—*Continued.*

Analysis.						Remarks by Analyst.	Name and Address of Vendor of Sample.
	Acidity in 100cc.						
Polarisation.	Total as Tart. Acid.	Fixed as Tart. Acid.	Volatile as Acetic Acid.	Ash.	Colour and Clearness.		
	p. c.	p. c.	p. c.	p. c.			
.. ..	0·665	0·584	0·065	0·23	Ruby, vy. clear	Adulterated as containing cane sugar.	B. B. Brunelle, Three Rivers.
....	0·604	0·543	0·049	0·54	Ruby, clear...	" " ..	Guay & Ostigny, Montreal.
... .	0·930	0·808	0·081	0·23	" ..	" " ..	" "
. . ....	0·571	0·509	0·049	0·23	Tawny, clear..	" " ..	" "
— 8·5	1·03	0·834	0·49	0·15	Red, bright...	Alcohol added; adult'd.	Bate & Co., Rideau st., Ottawa
— 11·5	1·36	1·14	0·36	0·15	Red, cloudy ..	" " .	" " "
— 16·1	1·57	0·93	0·07	0·14	Red, bright...	Foreign sugar added...	Godfroid Lebel " "
— 16·5	1·49	1·31	0·06	0·12	" ...	" " ..	" " "
— 6·8	1·14	1·07	0·02	0·14	Yellow, bright	" " ..	Wall & Co., Market Sq. "
— 11·4	1·43	1·35	0·02	0·17	Pale red, cl'dy.	" " ..	" " "
— 9·8	1·60	1·47	0·01	0·20	Red, bright...	" " ..	L. Laberge, Albion H'tl. "
— 10·3	1·27	1·15	0·03	0·15	" ...	Alcohol added; adult'd.	Kennedy & Co., Well'n st. "
— 14·8	1·32	1·23	0·02	0·17	" ..	" " ..	" " "
—19·5	0·825	0·619	0.165	0·170	Deep red, clear	I am of opinion that about 6 p.c. of sugar has been added.	E. Brown & Co., Peterborough.
+ 5·5c	0·549	0.406	0·114	0·205	Purple red, clear.	About 8 p.c. of sugar added.	Dagman & Co., Peterborough.
—29·3	0·719	0·568	0·121	0·160	Pale yellow, clear.	About 10 p.c. of sugar added.	" "
0·00	0·515	0·430	0·068	0·105	Yellowish white, clear.	About 3 p.c. of sugar added.	The Hoskins Wine Co., Hamilton.
—30·0	0·609	0·513	0·077	0·130	Yellow, clear	About 14 p.c. of sugar added, and some spirit	" " ..
—14·0	0·738	0.577	0·128	0·100	White, clear.	About 10 p.c. of sugar added.	J. O. Carpenter, Hamilton.
—41·7	0·734	0·610	0·099	0 115	Yellow, clear	About 16 p.c. of sugar added.	Rossin House liquor store, Toronto.
—20·0	0·670	0·566	0·083	0·200	" ..	About 15 p.c. of sugar added.	" " ..
—28·2	0 746	0·565	0 085	0·150	Red, clear....	About 13 p.c. of sugar added.	Michie & Co., Toronto.
-25·17	0·799	0·619	0·083	0·220	.. ..	About 15 p.c. of sugar added.	Wm. Mara, Toronto.
5·50	·644	·315	·263	·110	Red, clear....	Has had foreign sugar used.	Walsh Bros., Stratford, Ont.
- 2·50	·796	·466	·263	·110	Pale, clear ...	" ..	T. F. Quirk, Stratford, Ont.
— 3·5	·822	·548	·219	·175	Very deep wine red, clear.	" ..	J. Wilson, London, Ont.
— 4·8	·877	·723	·123	·195	" ..	" ..	E. B. Smith "
— 2·0	·710	·553	·149	·190	Clear, red....	Contains added alcohol and foreign sugar.	J. R. Campbell, Windsor, Ont.
— 1·5	·768	·570	·158	·200	"	Foreign sugar added..	" "

APPENDIX E.—INSPECTION OF CANADIAN

Date of Collection.	Description of Sample. Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Specific Gravity.		Alcohol in 100cc.			Total Solids in 100 cc.	Reducing Sugar as Dextrose.
				Of the Wine.	Dealcoholised Wine.	By Wt.	Of proof spirit.	By Vol.		
1899.	*Official Analyst, F. T. Harrison, London, Ont.*—Con.					p. c.	p. c.	p. c.	p. c.	p. c.
Nov. 3	Vendor	14154	19321	0·9910	1.0088	11·38	14·32	25·10	2·11	None.
,, 4	The Stanford Niagara Falls Co.	14155	19322	1·0353	1·0523	11·61	14·65	25·67	13·01	10·84
,, 4	C. Montreiul, Walkerville, Ont.	14156	19323	1·0287	1·0420	8·45	10·65	18·65	10·09	8·75
	Official Analyst, Prof. E. B. Kenrick, Winnipeg.									
,, 21	St. David's Vine Growers' Co., Toronto.	11347	17207	1·0405	......	10·05	......	......	14·56	12·51
,, 21	T. Bright, Niagara Falls....	11348	17208	1·0340	......	10·89	......	......	13·18	10·63
,, 21	Not known....	11349	17209	1·0507	......	10·20	......	......	17·28	14·50
,, 21	J. W. Lee & Co., Toronto....	11350	17210	1·0368	......	9·56	......	......	13·49	11 25
,, 21	The Hoskins Wine Co., Hamilton.	11351	17211	1·0550	......	8·74	......	......	17·95	14·71
,, 21	The Niagara Falls Wine Co..	11352	17212	1·0341	......	10·81	......	......	13·20	10·59
,, 21	The Hoskins Wine Co., Hamilton.	11353	17213	1 0453	......	9·08	......	......	15.61	12·63
,, 21	,, ,,	11354	17214	1·0506	......	10·20	......	......	17·26	14·37
,, 21	The Niagara Falls Wine Co..	11355	17215	1·0340	......	11·02	......	......	13·23	10·60
,, 21	,, ,,	11356	17216	1·0340	......	11·02	......	......	13·25	10·66
	Official Analyst, Dr. C. J. Fagan, Victoria, B.C.									
,, 13	Stanford Wine Co., Ontario..	15065	20162	1·0385	1·0574	7·13	8·88	15·56	12·39	....
,, 13	Hoskins Wine Co., Hamilton.	15066	20163	......	1·069	7·93	9·86	17·29	15·00	...
,, 13	R. B. Green, Hamilton	15067	20164	......	1·057	11·31	13·99	24·52	12·39	8·90
,, 24	T. G. Bright, Niagara Falls..	15068	20168	1·008	1·027	12·00	14·84	26·00	6·80	3·84
,, 24	Hoskins Wine Co., Hamilton	15069	20169	1·041	1·058	10·15	12·58	22·06	14·79	12·50
,, 24	Niagara Falls Wine Co.	15070	20170	1·042	1·057	8·78	10·91	19·11	14·55	13·32
,, 24	St. David's Wine Co., Toronto.	15071	20171	1·000	1·015	9·21	11·44	20·04	3·73	2·20
,, 24	T. G. Bright, Niagara Falls..	15072	20172	1·032	1·049	10·31	12 77	22·38	12·48	10·28

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NATIVE WINES—Tabulated Statement—*Concluded.*

Analysis.							
	Acidity in 100cc.						
Polarisation.	Total as Tart. Acid.	Fixed as Tart. Acid.	Volatile as Acetic Acid.	Ash.	Colour and Clearness.	Remarks by Analyst.	Name and Address of Vendor of Sample.
	p. c.	p. c.	p. c.	p. c.			
+ 0·2	·685	·510	·140	·130	Clean red	Probably contains a little added alcohol.	C. J. Stodgate, Windsor, Ont.
— 2·2	·768	·635	·106	·220	"	Foreign sugar added..	J. Garvey, London, Ont.
— 1·40	·521	·389	·106	·150	Fairly clear, red.	Foreign sugar added. The non-saccharine solids very low.	Scandrett Bros. "
+ 0·44	0·579	0·428	0·121	0·212	Red	The spectrum shows a band in the orange; contains added sugar	B. Cleland, Winnipeg, Man.
— 5·48	0·709	0·501	0·166	0·204	"	Spectrum shows no bands; contains added sugar.	Beliseau & Co. ,
— 7·88	0·606	0·416	0·152	0·150	"	" " ..	Paul Sala "
+ 0·11	0 594	0·458	0·109	0·225	"	Spectrum shows a band in the orange; contains added sugar.	W. J. Bawlf "
— 7·07	0·515	0·319	0·157	0·150	"	Spectrum shows no bands; contains added sugar.	G. F. & J. Galt "
— 5·50	0·708	0·507	0·161	0·203	"	" " ..	" "
— 6.16	0·595	0·374	0·177	0·195	"	" " ..	Strang & Co. "
— 7·87	0·587	0·408	0 143	0·165	"	" " ..	G. Velie "
— 5·49	0·716	0·501	0·172	0·212	"	" " ..	Richard & Co. "
— 5·48	0·718	0·500	0·174	0·208	"	" " ..	Hudson Bay Co. "
....	0·856	0·343	0·324	0·176	"	Genuine	Gold Seal Liquor Co., Vancouver, B.C.
....	0 725	0·443	0·153	0·126	"	....	Hopkirk, Spence & Co., Vancouver.
......	0·815	0 345	0·180	0·118	"	Added sugar	Weeks & Robson, Vancouver, B.C.
......	0·94	0·75	0·14	0·20	"	....	Hugh Urquhart, Vancouver, B.C.
....	0·195	0·125	0·060	0·204	"	Added sugar.... . ..	Gold Seal Liquor Co., Vancouver, B.C.
....	0·55	0 44	0·09	0·208	"	"	" "
....	1·22	0·69	0·58	0·156	"	....	J. P. Turner, Vancouver, B.C.
....	2·25	0·66	1·27	0·204	"	Added sugar.........	Weeks & Robson, Vancouver, B.C.

APPENDIX F.—INSPECTION OF SPIRITS

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Sp. gr. at 15·5 C.	By Weight.
1900.		*Official Analyst, Dr. F. X. Valade, Ottawa.*				p. c.
Mar.	3.	Spirits of Camphor—J. Skinner & Co., Ottawa	14675	20671	0·8404	87·65
"	3.	" " G. E. Kennedy, Ottawa	14676	20672	0·8377	88·88
"	3.	" " H. F. MacCarthy, Ottawa	14677	20673	0·8527	82·42
"	3.	" " W. H. Roger, Ottawa	14678	20674	0·8395	87·92
"	3.	" " Belanger & Co., Ottawa	14679	20675	0·8383	89·00
"	3.	" " W. A. Lloyd, Ottawa	14680	20676	0·8372	89·04
"	7.	" " F. R. Curry, Brockville	14681	20677	0·8379	88·56
"	7.	" " A. Fullerton, Brockville	14682	20678	0·8492	83·77
"	7.	" " J. McCallum, Brockville	14683	20679	0·8478	84·44
		Official Analyst, F. T. Harrison, London, Ont.				
Feb.	9.	Spirits of Camphor—Bradley, Sons & Co., Montreal	14178	19672	0·8705	67·18
"	12.	" " Kerry, Watson & Co., Montreal	14179	19673	0·8606	71·52
"	12.	" " Evans, Sons & Co., Montreal	14180	19674	0·8473	77·69
"	12.	" " Dart & Chapman, Montreal	14181	19675	0·8509	76·78

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OF CAMPHOR—Tabulated Statement.

Result of Analysis. Alcohol. By Volume.	Alcohol. Proof Spirits.	Camphor; grams in 100.	Methyl Alcohol.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.				
91·52	160·38	11·0	None.	Genuine but above the B.P. standard for 1898, alcohol used being too strong and the quantity of camphor too great.	Vendor.
92·45	162·02	11·3	....	Above the 1898 B.P. standard for alcohol and camphor.	"
87·46	153·27	9·96	None.	A little below standard in alcohol	"
91·72	160·74	10·9	....	Above the 1898 B.P. standard......................	"
92·54	162·18	12·3	....	" " "	"
92·57	162·23	12·3	None.	" " "	"
92·21	161·59	10·9	None.	" " "	"
88·52	155·13	9·96	None.	Genuine..	"
89·05	156·05	10·2	None.	"	"
73·68	129·13	8·6	None.	Below the B.P. standard in spirits and in camphor, and is therefore adulterated.	"
77·56	135·92	8·5	None.	Below the B.P. standard in camphor and a little low in spirit, and is therefore slightly adulterated.	"
82·96	145·38	9·5	None.	A little below the B.P. standard in camphor, and a little above in spirit strength.	"
82·28	144·20	9·0	None.	" " " " ..	"

APPENDIX G.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result		
				Moisture.	Ash.	Reducing Sug... Glucose direct.
1899.	*Official Analyst, F. T. Harrison, London, Ont.*			p. c.	p. c.	p. c.
Dec. 23	Honey—Not known	14158	20650	23·0	0·27	73·92
" 23	" Rutherford & Marshall, Toronto	14159	20651	22·3	0·07	79·37
" 23	" Not known	14160	20652	28·5	0·21	72·20
" 23	" "	14161	20653	21·4	0·08	78·91
" 23	" Sent by J. K. Darling, Almonte	14162	20654	20·3	0·03	80·72
" 23	" " "	14163	20655	22·9	0·26	67·57
1900.	*Official Analyst, M. Bowman, Halifax, N.S.*					
April 25	Honey—Simpson Bros., Halifax	12793	16759	35·87	0·19	66·03
" 25	" E. Smith, Falmouth, N S.	12794	16760	35·38	0·30	69·30
" 26	" Simpson Bros., Halifax	12795	16761	35·15	0·18	67·25
" 26	" Bowman & Angivine, Halifax	12796	16762	26·64	0·41	46·09
" 26	" Brown & Webb, Halifax	12797	16763	32·21	0·22	72·15
" 30	" Simpson Bros., Halifax	12798	16764	35·87	0·18	68·33
" 30	" W. D. Black, Truro, N.S.	12799	16765	29·02	0·09	72·70
May 1	" " "	12800	16766	37·00	0·05	70·50
" 1	" Brown and Webb, Halifax	12801	16767	32·37	0·27	73·75
" 1	" W. D. Black, Truro, N.S.	12802	16768	29·80	0·07	71·50
" 1	" Irwin & Sons, Halifax	12803	16769	32·50	0 18	69·60
April 9	" The Ayer Preserving Co., Ayer, Mass., U.S.A.	12788	17701	27·74	0·34	47·39
" 9	" Bowman & Angivine, Halifax	12789	17702	24·30	0·39	41·40
" 10	" " "	12790	17703	27·33	0·35	48·55
" 10	" Colpitts Bros., Pleasant Vale, N.B.	12791	17704	27·42	0·14	71·18
" 10	" Ayer Preserving Co.	12792	17705	26·52	0·34	48·32

HONEY—Tabulated Statement.

of Analyis.

Reducing Sugar after inversion.	Sucrose.	Sp. rot. power. Direct reading.	Sp. rot. power. Invert.	Sucrose by Clerget.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.			p. c.		
74·37	0·43	− 8·0°	− 9·0°	1·05	Unadulterated........	Mrs. E. M. Bullen, Toronto.
82·53	3·01	−11·6°	−13·6°	2·05	"	John Callicott, Toronto.
72·33	0·12	−11·6°	−11·6°	.....	"	James Sutherland, Peterboro.
78·91	......	− 9·0°	−10·0°	1·05	"	P. Connall & Son, Peterboro.
80·72	...	−13·0°	−14·0°	1·05	"	John Callicot, Toronto.
68·48	0·86	+30·4°	+26·0°	4·81	Adulterated with starch glucose.	Mrs. E. M. Bullen, Toronto.
......	.....	−10·80	−14·52	2·78	Genuine....	H. E. Wilson, Windsor, N.S.
72·40	2·94	−11·80	−17·04	3·91	"	R. B. Dakin, Windsor, N.S.
..	......	−10·84	−15·04	3·13	"	G. C. McDougall, Kentville, N.S.
...	...	132·00	126·94	3·78	Adulterated with glucose....	K. B. Bishop, Kentville, N.S.
73·60	1·37	−10·80	−20·02	6·89	Genuine	H. W. Davison, Wolfville, N.S.
69·35	0·99	−11·36	−14·62	2·43	"	J. B. Maclean, Dartmouth, N.S.
....	.....	−10·00	−14·70	3·52	"	S. Thomson, Dartmouth, N.S.
....	.....	−12·54	−17·48	3·71	"	Buckley Bros., Halifax, N.S.
77·55	3·61	−10·64	−18·92	6·24	"	H. A. Taylor, Halifax, N.S.
....	.....	−11·60	−15·18	2·68	"	S. R. Frame, Halifax, N.S.
73·80	3·99	− 6·92	−14·45	5·65	"	John Davison & Son, Rockingham, N.S.
....	....	100·44	92·27	6·11	Adulterated with glucose....	W. A. Porter, St. John, N.B. Not sold as pure honey.
.....	.....	147·96	143·00	3·72	" "	C. A. Clark, St. John, N.B.
...	..	102·02	93·54	6·34	" "	M. & H. Gallagher, St. John, N.B. Vendor doubted purity of honey; was left as sample.
....	....	−14·32	−18·08	2·80	Genuine.......	W. A. Porter, St. John, N.B.
......	.....	100·08	93·63	4·82	Adulterated with glucose....	Geo. S. De Forests Sons, St. John, N.B. Left at vendor's as sample.

APPENDIX H.—INSPECTION OF

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of				
					Insoluble.		Sulphuric Acid.	Chlorine.	Lime.
					Total.	Sand.			
1900		*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.	p. c.	p. c.	p. c.
May	2	Salt Imported	14701	19901	0·061	0·035	1·021	59.119	0·844
"	2	" Liverpool salt	14702	19902	0·015	None.	0·583	58·415	0·518
"	3	" Imported	14703	19903	0·047	0·012	0·694	58·943	0·554
"	3	" J. T. Morton, London, Eng.	14704	19905	0·065	None.	1·281	59·305	1·008
"	3	" Liverpool salt	14705	19906	0·022	0·0044	0·909	58·943	0·848
"	3	" Imported	14706	19907	0·056	0·029	0·665	53·49	0·668
"	9	" Crosse & Blackwell, London, E.	14707	19909	0·026	None.	1·422	59·471	0·652
"	9	" Imported	14708	19910	4·012	0·007	1·222	57·711	2·967
"	9	" Snow Flake Salt Co., Jersey City, N.Y.	14709	19911	0·424	0·025	1·124	58·943	0·954
		Official Analyst, F. T. Harrison, London, Ont.							
"	2	Salt Coleman Bros., salt manufacturers, Seaforth, Ont.	14205	19343	0·014	....	0·480	56·592	0·072
"	3	" Ransford Bros., manufacturers, Stapleton, near Clinton	14206	19344	0·011	....	0·424	58·714	0·057
"	5	" G. McEwen, manufacturer, Hensall, Ont.	14207	19345	0·046	....	0·784	58·007	0·742
"	5	" Exeter Salt Works, Ont.	14208	19346	0·014	....	0·329	58·360	0·474
"	7	" R. & J. Ransford, manufacturers, Goderich, Ont.	14209	19347	0·014	....	0·667	56·946	0·633
"	7	" P. McEwen, manufacturer, Goderich, Ont.	14210	19348	0·021	....	0·405	56·946	0·461
"	8	" F. Sparling, Wingham Salt Works	14211	19349	0·022	....	0·718	56·592	0·688
"	9	" Ontario Peoples' Salt and Soda Co., Kincardine	14212	19350	0·010	....	0·419	56·240	0·407
"	10	" Coleman Bros., manufacturers, Brussells, Ont.	14213	19351	0·013	....	0·836	53·586	0·734

COMMON SALT—Tabulated Statement.

Analysis. Magnesia.	Potash.	Soda.	Moisture.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.	p. c.	p. c.		
0·066	0·002	49·90	....	Coarse grained and dry; SO_3 rather high; some large pieces of mortar or plaster in the salt, probably accidental.	R. Palmer, Ottawa.
0·071	0·017	49·24	... ...	Too wet, containing over 5% of water.	Wall & Co. "
0·036	0·025	50·34	......	Good..........	T. Brown & Co., Brockville.
0·125	0·058	50·43	....	SO_3 and CaO rather high; fairly good.	J. Culbert "
0·093	0·045	49·30	.....	Coarse grained salt and wet; contains organic matter; SO_3 and CaO rather high; too wet, containing over 2% of water.	J. W. Armstrong, Cornwall.
0·100	0·062	46·87	....	Too wet, containing over 5% of water.	J. E. Chevrier "
0·082	0.040	50·86	....	Fine salt, white and dry; good	Fraser & Viger, Montreal.
0·124	0·009	48·79	....	Fine grain, white and dry; much insoluble matter, including phosphates; unfit for table use, containing too much insoluble matter.	" "
0·099	0·023	50·32	....	" "	" "
0·018	....	36·56	4·725	....	Manufacturers.
0·012	....	37·70	2·250	....	"
0·012	... .	37·96	2·225	....	"
0·028	....	37·90	2·050	....	"
0·018	....	37.311	4·400	....	"
0·015	....	37·175	5·050	....	"
0·019	....	36·777	5·700	....	"
0·012	....	36·972	6·100	....	"
0·014	... ...	34·992	9·625	....	"

APPENDIX I.—INSPECTION OF SALTPETRE.—Tabulated Statement.

Date of Collection.		Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis: Nitrogen	Nitric Acid.	Potash.	Soda.	Remarks by Analyst.	Name and Address of Vendor of Sample.
1900.		*Official Analyst, Dr. W. H. Ellis, Toronto.*			p. c.	p. c.	p. c.	p. c.		
May	3	Saltpetre, not known	12449	20701	16·26	62·57	....	35·93	Genuine soda saltpetre; but if sold as "saltpetre," I am of opinion that it is adulterated.	Bryson, Graham & Co., Ottawa.
"	3	" "	12450	20702	16·00	61·57	....	35·36	" "	Hudson & Powell, Ottawa.
"	3	" "	12451	20703	15·41	59·30	0·29	33·87	" "	F. A. Scott, Ottawa.
"	7	" "	12452	20704	14·00	53·87	46·63	.....	Genuine saltpetre	J. Williams, Brockville, Ont.
"	7	" "	12453	20705	16·39	63·07	....	36·22	Genuine soda saltpetre; but if sold as "saltpetre," it is adulterated.	T. J. B. Harding, Brockville, Ont.
"	7	" "	12454	20706	16·15	62·14	....	35·68	" "	McRae Bros., Kingston.
"	7	" W. & F. P. Currie & Co., Montreal.	12455	20707	16·25	62·53	....	35·91	" "	Rigney & Hickey, Kingston.
"	8	" not known	12456	20708	15·16	58·33	17·09	22·25	A mixture of saltpetre and soda saltpetre. If sold as "saltpetre" I consider this adulterated.	T. Martin, Ottawa.
"	8	" "	12457	20709	13·84	53·26	46·44	....	Genuine saltpetre	J. Skinner & Co., Ottawa.
"	8	" "	12458	20710	14·36	55·26	34·27	9·17	A mixture of saltpetre and soda saltpetre. If sold as "saltpetre" adulterated.	T. L. Pinard, Ottawa.

APPENDIX J.

BULLETIN No. 67—OLIVE OIL.

OTTAWA, December 12, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—In consequence of an application in June last from the General Italian Consulate in Montreal, the Honourable the Minister of Inland Revenue gave instructions that samples of olive oil, as sold throughout the Dominion, should be collected and submitted to the various district analysts for examination, with the view of determining to what extent this article is subject to adulteration.

The samples were collected in July and August of the present year, and their origin and character will be evident from the particulars given in the accompanying tabulated statement. Seventy-five samples were collected in all, and of these 30 were found by the district analysts to be adulterated, 5 doubtful and 40 genuine. The analytical results as well as the opinions of the analysts are given in the table, from which it will be observed that the chief adulterant is cottonseed oil, although other oils are suspected of being present. In fact in a great many cases the adulteration consists in the simple substitution of cottonseed oil for the genuine article. Under section 2 (*e*) 4 of the Adulteration Act, if regarded as food, the 'olive oil' in question is to be deemed to be adulterated because it is an imitation of and sold under the name of another article. If placed under drugs it must also be regarded as adulterated, since it differs from the standard laid down in the British Pharmacopœia. In my report to you of October 10, I called your attention to 25 of these cases of adulteration, and recommended that in these the provisions of the Adulteration Act should be applied. I beg to suggest the publication of the present report.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

RESULTS of the Examination of

No. of Sample.	Date of Collection.	Quantity Purchased.	Price.	Name and Address of Vendor.	Manufacturer or Furnisher, as given by Vendor.	Specific Gravity at 15·5 C.	Iodine Absorption.
	1899.		$ cts.	*Truro, N.S.*		p. c.	p. c.
16723	July 19	1 pt ...	0 35	A. E. Smith, not sold for internal use.	Maritime Drug Co., St. John, N.B.	0·9212	......
				New Glasgow, N.S.			
16724	" 19	1 "	0 50	G. Carew........... ...	Brown & Webb, Halifax, N.S....	0·9144	.. ..
				Halifax, N.S.			
16725	" 21	1 " ...	0 60	Buckley Bros., Barrington St.	J. Plagniol, Paris, France.......	0·9152	.... .
16726	" 21	1 " ...	0 50	G. H. Colwell, Barrington St.	Brown & Webb, Halifax.... ..	0·9144	. ....
16727	" 21	1 "	0 35	Hattie & Mylins, Hollis St	Leeming & Miles, Montreal.	0·9140	.....
				St. John, N.B.			
17664	" 17	1 "	0 30	Canadian Drug Co., Prince William St.	Imported from Italy by vendors..	0·9155	....
17665	" 17	1 "	0 25	Silas McDiarmid, 17 Market Square.	Imperial Oil Co., Ltd., St. John, N.B.	0·9150	......
17666	" 17	1 "	0 40	Chipman, Smith & Co., 41 Charlotte St.	Lyman Sons & Co., Montreal.. ..	0·9150	....
				Moncton, N.B.			
17669	" 26	1 "	0 45	Fairweather Bros...... .	Evans & Sons, Montreal..... ..	0·9150	......
				Bathurst, N.B.			
17672	" 28	1 " ..	0 60	Chipman, Smith & Co....	A. C. Smith & Co., St. John, N.B.	0·9155	...
				Quebec.			
19544	" 13	1 bottle.	0 90	M. W. Coleman, 98 Bridge St.	N. Johnston & Sons, Bordeaux .	0·916	81 20
19545	" 13	1 " ..	0 75	" " ..	V. A. Hunziker & Fils, Salon, Province	0·916	83 89
19546	" 13	1 pt ..	0 13	C. S. Riverin, Crown St..	....	0·922	107 94
19547	" 13	2 bottles	1 00	A. J. Turcotte & Co., Crown St.	Alex. Godillot	0·915	83·59
19548	" 13	1 bottle.	0 50	E. Turcotte, 74 Defosses St	....	0·921	102 66
				Coaticook, P.Q.			
19549	" 14	1 pt...	0 40	A. W. Sanborn, Charles St	Lyman Sons & Co., Montreal....	0·916	84·13
19550	" 14	1 " ...	0 50	Dr. Stevenson	....	0·916	86·24
				Sherbrooke, P.Q.			
19551	" 14	1 " ..	0 25	W. H. Griffith, Wellington St.	....	0·922	108·21
19552	" 14	2 bottles	0 40	D. W. Stenson, King St..	E. Loubon, Nice..........	0·921	109 89
19553	" 14	1 pt....	0 60	J. L. Mathieu, Wellington St.	Lyman, Knox & Co......	0·916	81·55

SESSIONAL PAPER No. 14

75 Samples of Olive Oil.

Results of Analysis.									
Reaction with Silver Test.	Maumenès' Test. Rise in Temperature	Nitric Acid Test.	Elaidin Test.	Gain on heating and exposure to air.	Colour.	Taste.	No. of Sample.	Analyst.	Remarks.
				p. c.					
Black ..	....	....	....	..	....	..	16723	M. Bowman, Halifax.	Largely composed of cotton seed oil.
Nil ...	......	....	....	... ..	....	......	16724	" ..	Genuine.
Trace...	....	.... .	....	.....	....	.. ..	16725	" ..	do
Nil	....	....	....	.....	....	.....	16726	" ..	do
Trace...	....	.... . .	....	.....	....	...	16727	" ..	do
Nil	....	....	....	....	....	.....	17664	" ..	do
Slight. .	....	... .. .	.... .	.....	... .	......	17665	" ..	Doubtful.
" ..	......	.....	....	.....	....	.....	17666	" ..	do
Nil	... .	....	....	....	....	.....	17669	" ..	Genuine.
Trace...	... .	....	.... . .	......	....	....	17672	" ..	do
....	42·0 °C.	Yellow. ..	....	4·21	Yellow. ..	Good.	19544	Dr. M. Fiset, Que.	do
....	44·0 °C.	"	....	3·24	"	" ..	19545	" ..	do
....	81·0 °C.	Dk. brown	....	5·81	"	Fair ..	19546	" ..	Sample has a rather peculiar smell. Adulterated.
....	42·0 °C.	Yellowish	....	4·19	Greenish yellow.	Good.	19547	" .	Genuine.
....	74·0 °C.	Dk. brown	....	5·27	Yellow. ..	" ..	19548	" ..	Adulterated.
....	42·0 °C.	Greenish yellow.	....	4·58	" . .	" ..	19549	" ..	Genuine.
....	47·0 °C.	Brownish yellow.	....	5·80	"	" ..	19550	" ..	do
... ..	84·0 °C.	Dk. brown	....	6·33	"	" ..	19551	" ..	Adulterated.
....	79·0 °C.	" ..	....	6·05	"	" ..	19552	" .	do
....	44·0 °C.	Yellow. ..	....	5·68	"	" ..	19553	" ..	Genuine.

RESULTS of the Examination of

No. of Sample.	Date of Collection.	Quantity Purchased.	Price.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Specific Gravity at 15·5° C.	Iodine Absorption.
	1899.		$ cts.	*Montreal.*		p. c.	p. c.
19522	July 10	1 bottle.	0 50	P. Daoust, 1830 St. Catherine St.	Laporte, Martin & Co., Montreal	0·9151	84·03
19523	" 10	1 pt ...	0 15	O. A. Bigaouette, 1564 St. Catherine St.	" " ..	0·9236	109·92
19524	" 10	1 "	0 25	" " ..	" " ..	0·9160	88·05
				Huntingdon, P.Q.			
19525	" 11	1 "	0 50	James Fortune, Main St.	....	0·9245	102·50
19526	" 11	4 small bottles	0 40	R. E. Kelly..	Baron & Gauthier	0·9213	111·73
				St. Johns, P.Q.			
19527	" 11	1 pt....	0 35	Wright & Co., Richelieu St.	Lyman, Sons & Co., Montreal....	0·922	111·63
19528	" 11	1 "	0 50	" " ..	" "	0·9172	84·74
				Three Rivers, P.Q.			
19529	" 27	2 bottles	0 80	Louis Brunelle & Frere ..	Adolphe Puget.....	0·9165	81·80
19541	" 27	1 pt....	0 60	L. A. Hoerner....	... .	0·9165	80·63
				Montreal.			
19542	" 28	1 " ...	0 40	A. Dini, 2056 St. Catherine St.	Imported	0·9168	79·45
19543	" 28	1 bottle.	0 40	J. E. Manning, 305 St. Antoine St.	A. Morgnes & Fils.....	0·9167	85·38
				Ottawa.			
18433	Aug. 3	1 pt....	0 50	A. L. Pinard, 118 Rideau St.	Barton & Guester, Bordeaux, France.	0·9186	80·35
18434	" 3	1 "	0 35	M. A. Belanger, Rideau St.	....	0·9232	105·0
18435	" 3	3 bottles (12 oz.)	0 45	Wm. Cunningham, grocer, Rideau St.	J. B. & A. Artand Freres, Marseilles, France.	0·9170	79·6
18436	" 3	16 oz...	0 40	J. S. Brown, druggist, Rideau St.	Lyman, Sons & Co., Montreal....	0·9184	83·3
18437	" 3	12 " ..	0 30	Wm. Moeser, grocer, 29 York St.	J. Loubon, Nice	0·9212	104·0
				Carleton Place, Ont.			
18438	" 4	1 pt....	0 50	W. S. Robertson, druggist.	... .	0·9152	82·3

75 Samples of Olive Oil—*Continued.*

Results of Analysis.							No. of Sample.	Analyst.	Remarks.
Reaction with Silver Test.	Maumenès' Test. Rise in Temperature	Nitric Acid Test.	Elaidin Test.	Gain on heating and exposure to air.	Colour.	Taste.			
				p. c.					
Nil ...	....	....	....	1·26	....	...	19522	Dr. J. B. Edwards, Montreal.	Genuine.
Blackened.	....	....	....	·01	....	.....	19523	" ..	Adulterated, being mainly cotton seed oil.
Nil	....	....	....	0·27	....	......	19524	" ..	Genuine.
Darkened.	....	....	....	2·42	....	...	19525	" ..	Adulterated, being chiefly cotton seed oil.
Very black.	....	....	....	2·77	....	....	19526	" ..	do
" ..	....	....	....	3·67	....	...	19527	" ..	Sold as common olive oil. Adulterated being cotton seed oil.
Nil	....	....	....	4·40	....	.....	19528	" ..	Genuine.
"	....	....	....	4·08	....	....	19529	" ..	do
" ...	....	....	....	1·56	....	.....	19541	" .	do
"	....	....	....	2·82	....	......	19542	" ..	do
Slight brown colour	....	....	....	1·97	....	......	19543	" ..	May contain a trace of cotton seed oil. Adulteration doubtful.
Nearly white & clear	44·5° C..	....	Solid and pale.	0·14	....	. .	18433	Dr. F. X. Valade, Ottawa.	Pure.
Dark & muddy	74·5° C..	....	....	1·29	....	.....	18434	" ..	Adulterated with cotton seed oil.
Cloudy & slight black deposit	45·0° C..	....	Orange liquid on top.	2·21	....	......	18435	" ..	Doubtful; probably contains a very small percentage of cotton seed oil.
Clear deep orange colour	53·0° C..	....	Yellow on top and mass too yellow.	1·86	....	......	18436	" ..	Doubtful; probably contains a small percentage of sesami oil.
Turbid & black deposit	74·0° C..	......	Orange liquid on top.	1·79	....	....	18437	" ..	Adulterated with cotton seed oil.
White & clear	45·0° C..	....	All solid, slightly too yellow.	1·22	....	......	18438	" ..	Pure.

RESULTS of the Examination of

No. of Sample.	Date of Collection.		Quantity Purchased.	Price.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Specific Gravity at 15·5 C.	Iodine Absorption.
	1899			$ cts.	*Carleton Place*—Con.			p.c.
18439	Aug.		1 pt....	0 40	Dr. D. H. McIntosh, druggist.	....	0·9210	95·0
					Perth, Ont.			
18440	"	4	1 "	0 35	Bower & Son, druggists..	Elliott & Co., Toronto....	0·9145	84·0
18441	"	4	16 oz...	0 50	J. F. Kellock, druggist ..	Warrick Freres, Grasse, France..	0·9170	88·0
					Brockville.			
18413	July	13	1 pt....	0 50	F. J. Morgan, grocer, King St.	E. Loubon, Nice	0·9232	108·6
18414	"	13	½ "	0 35	P. K. McMullan, druggist	Lyman & Knox, Toronto . .	0·9226	97·35
					Trenton, Ont.			
18415	"	13	1 "	0 50	S. Hooey, grocer..... ...	Crosse & Blackwell, London, E..	0·9167	79·85
18416	"	13	1 "	0 20	A. W. Hawley, druggist..	Not known	0·9241	103·6
					Oshawa, Ont.			
18417	"	14	1 "	0 50	Jury & Gregory, druggists	Elliott & Co., Toronto.	0·9183	81·0[illegible]
18418	"	14	1 "	0 60	R. W. & A. Chambers, druggists.	Enrico, Gannie & Co., Leghorn, Italy.	0 9176	79·38
					Toronto.			
18419	"	14	1 " ...	0 60	M. D. Hall, druggist, cor. Queen and York Sts.	Evans & Son, Toronto	0·9177	81·59
18420	"	14	16 oz...	0 40	E. G. Lemaitre, druggist, Queen St.	J. Placinol, Marseille	0 9190	98·50
					Hull, P.Q			
18421	"	19	16 " ...	0 50	M. J. Laverdure, grocer .	Dandicolle & Gondin, Bordeaux .	0·9175	79·44
18422	"	19	½ pt....	0 25	J. G. Faulkner, druggist.	Evans & Sons, Montreal.........	0·9167	81·35
					Stratford, Ont.			
19259	"	11	1 "	0 40	C. E. Nasmyth & Co., druggists.	J. Winer & Co., Hamilton, Ont..	0·9175	91·37
19262	"	11	1 "	0 25	Shaver & Co., druggists.	J. Kennedy, druggist, London, Ont.	0·9228	105·10
					London, Ont.			
19263	"	12	1 "	0 25	J. M. Duncan, Dufferin Ave.	J. Kennedy, druggist, London, Ont.	0·9221	111·39
19264	"	12	1 " ...	0 50	C. Symmonds, 468 Dundas St.	Kerry, Watson & Co., London, Ont.	0·9157	82·41
19266	"	12	1 "	0 50	Cairncross & Lawrence, 216 Dundas St.	J. Winer & Co., Hamilton..... .	0·9164	80·61

75 Samples of Olive Oil—*Continued.*

Results of Analysis.							No. of Sample.	Analyst.	Remarks.
Reaction with Silver Test.	Maumenès' Test. Rise in Temperature	Nitric Acid Test.	Elaidin Test.	Gain on heating and exposure to air.	Colour.	Taste.			
				p.c.					
Black & turbid	73·0° C..	....	....	3·42	.....	......	18439	Dr. F.X. Valade, Ottawa.	Adulterated with cotton seed oil.
Straw coloured, clear	49·0° C..	....	All solid, slightly too yellow.	2·12	....	....	18440	" ..	Pure.
Pale and clear.	45·0° C..	....	Orange liquid on top.	2·21	....	......	18441	" ..	do
Black ..	....	D'k brown	No change	3·55	Yellow...	..	18413	Dr. W. H. Ellis, Toronto.	Adulterated with cotton seed oil.
" ..	......	Brown....	" .	2·52	Colourless	......	18414	" ..	do
No change	....	No change	" .	2·75	Yellow...	.....	18415	" ..	Genuine.
Black ..	....	Brown....	" .	2·66	" ...	.....	18416	" ..	Adulterated with cotton seed oil.
No change	....	No change	Very faint pink tinge	2·65	" ...	.....	18417	" ..	Genuine.
" .	....	" .	No change	2·82	Green	......	18418	" ..	do
" .	....	Lgt brown	....	2·83	" ...	......	18419	" ..	do
Black ..	....	Brown....	No change	2·81	Yellow...	....	18420	" ..	Adulterated with cotton seed oil.
No change	....	No change	" .	3·16	" ...	....	18421	" ..	Genuine.
" .	....	" .	" .	3·28	Pale yellow.	.....	18422	" ..	do
Very slight darkening.	......	....	....	3·90	....	...	19259	F. T. Harrison, London, Ont.	Unadulterated.
Deep r'd brown	....	....	....	4·70	....	.....	19262	" ..	Adulterated, being cotton seed oil.
Black ..	......	...	....	5·45	....	.....	19263	" ..	do
No change	......	....	....	5·01	....	...	19264	" ..	Unadulterated.
" .	....	....	......	4·28	....	....	19266	" ..	do

RESULTS of the Examination of

No. of Sample.	Date of Collection.	Quantity Purchased.	Price.	Name and address of Vendor.	Name and address of Manufacturer or Furnisher, as given by Vendor.	Specific Gravity at 15·5° C.	Iodine Absorption.
	1899.		$ cts.	*Windsor, Ont.*			p.c.
19269	July 13	1 pt.	0 35	J. Labelle, druggist		0·9228	110·22
19271	" 13	1 "	0 40	H. D. Fleming, druggist.		0·9165	81·15
				Woodstock, Ont.			
19273	" 13	1 "	0 40	Fraser & Gunn, druggists.	J. Kennedy, London, Ont.	0·9169	83·22
19275	" 13	1 "	0 40	J. H. Nasmyth, druggist.		0·9220	108·80
				Winnipeg, Man.			
17167	" 28	1 "	0 50	Thos. Jobin	Crosse & Blackwell, London, E.	0·9165	82·75
17168	" 28	1 "	0 40	Collin & Son	J. Loubon, Nice	0·9231	115·6
17169	" 29	1 "	0 60	Hudson's Bay Co	Johnson & Sons, Bordeaux, France	0·9166	84·33
17170	Aug. 2	1 "	0 50	Collin & Son	Adolphe Puget, Marseilles, France.	0·9195	99·84
17171	" 2	1 "	0 60	J. G. Hargrave & Co	J. B. & A. Artand Bros., Marseilles.	0·9215	105·2
17172	" 3	1 "	0 35	The Bole Drug Co	Adolphe Puget, Marseilles.	0·9181	89·31
17173	" 3	1 "	0 40	"	"	0·9167	85·02
17174	" 3	1 "	0 40	The Martin Bole Wynne Co.	"	0·9167	85·34
				Vancouver, B.C.			
20125	" 20	1 bottle.	0 25	A. E. Phœnix, 35 Hastings St.	E. & T. Pinks, London, E.	0·9170	81·97
20129	" 20	1 "	0 75	J. Donald & Co., 318 Carroll St.	C. M. Gifford, California	0·9178	86·34
20132	" 20	1 "	0 25	Blanchfield & Co., 205 Carroll St.	Bunnel Bros., Marseilles	0·9228	109·78
20133	" 20	1 "	1 00	R. G. McPherson, 436 Cardova St.		0·9170	80·56
20134	" 21	1 "	0 30	C. E. Turner, Columbia St.	J. Loubon, Nice, France	0·9229	111·59
				New Westminster, B.C.			
20137	" 21	1 "	0 40	E. J. Rae	Crosse & Blackwell, London, E.	0·9168	81·09
20138	" 21	1 "	0 75	D. S. Curtis		0·9161	81·60
20139	" 21	1 "	0 75	T. A. Muir & Co		0·9164	80·54

75 Samples of Olive Oil—*Concluded.*

Results of Analysis.							No. of Sample.	Analyst.	Remarks.
Reaction with Silver Test.	Maumenès' Test. Rise in Temperature	Nitric Acid Test.	Elaidin Test.	Gain on heating and exposure to air.	Colour.	Taste.			
				p.c.					
Black	....	....	....	5·71	....	....	19269	F. T. Harrison London, Ont.	Adulterated, being cotton seed oil.
No change	....	....	....	4·77	....	....	19271	"	Unadulterated.
Greenish tinge	....	....	....	5·40	....	....	19273	"	do
Black	....	....	....	5·15	....	....	19275	"	Adulterated, being cotton seed oil.
No reduction	....	....	....	....	....	....	17167	Prof. E. B. Kenrick, Winnipeg, Man.	Genuine.
Reduction.	....	....	....	....	....	....	17168	"	Adulterated, apparently pure cotton seed oil.
No reduction	....	....	....	....	....	....	17169	"	Genuine.
"	....	....	....	....	....	....	17170	"	Adulterated, probably pea-nut oil.
Reduction.	....	....	....	....	....	....	17171	"	Adulterated with cotton seed oil.
"	....	....	....	....	....	....	17172	"	do
No reduction	....	....	....	....	....	....	17173	"	Genuine.
"	....	....	....	....	....	....	17174	"	do
Greenish black	....	....	....	....	....	....	20125	Dr. C. J. Fagan, New Westminster, B.C.	Adulterated with cotton seed oil.
Unchanged	....	....	....	....	....	....	20129	"	Genuine.
Greenish black	....	....	....	....	....	....	20132	"	Adulterated with cotton seed oil.
Unchanged	....	....	....	....	....	....	20133	"	Genuine.
Greenish black	....	....	....	....	....	....	20134	"	Adulterated with cotton seed oil.
"	....	....	....	....	....	....	20137	"	do
"	....	....	....	....	....	....	20138	"	do
"	....	....	....	....	....	....	20139	"	do

APPENDIX K.

BULLETIN No. 68.—BAKING POWDERS.

OTTAWA, April 6, 1900.

W. J. GERALD, Esq.,
Acting Commissioner of Inland Revenue.

SIR,—In accordance with the instructions of the Commissioner of Inland Revenue a collection of samples of baking powders was made in September, 1899. The following is a statement of the number obtained in each revenue district and shows the classes to which they belong:—

Name of District.	Nature of Acid Constituents.			Total Number Collected.
	Cream of Tartar.	Alum and Acid Phosphate.	Alum.	
Halifax	18	2	2	22
Quebec	2	16	2	20
Montreal	6	16	....	22
Ottawa	8	4	6	18
Toronto	2	12	6	20
London	4	10	4	18
Winnipeg	2	14	4	20
Vancouver	2	14	....	16
	44	88	24	156

These figures show that over 70 per cent of the baking powders sold in Canada contain alum, mostly associated with acid phosphate, and that 15 per cent of the total number of samples collected were made up of bi-carbonate of soda and burnt alum without any other acid constituent. On January 9 last I recommended that legal proceedings should be taken in five of these cases, in order to obtain authoritative decisions as to the lawfulness of using alum in baking powers. This was not deemed advisable, although I have no doubt that the practice would be condemned by the courts. There has not been any difficulty in obtaining judgment against parties using alum in bread, but it was not so easy in the case of baking powder, which was not regarded as an article of food. In May, 1888, an amendment to the Adulteration Act declared that 'The expression "food" includes every article used for food or drink by man or cattle 'and every ingredient intended for mixing with the food or drink of man or cattle for 'any purpose whatsoever.' Under this clause it would appear to be quite possible to obtain a judgment in Canada against the use of alum in baking powders.

The same difficulty existed in England until 1899, when the "Sale of Food and Drugs Act" was passed, section 26 of which reads as follows:—'For the purposes of 'the Sale of Food and Drugs Acts, the expression "food" shall include every article used 'for food or drink by man, other than drugs or water, and any article which ordinarily 'enters into or is used in the composition or preparation of human food, and shall 'also include flavouring matters and condiments.' In consequence of this enactment, prosecutions for using alum in baking powders are becoming frequent and successful in England. In order that the situation there may be thoroughly understood the following newspaper reports may be quoted:—

ALUM IN BAKING POWDER.

Heber Hunt, grocer, of Wooton Bassett, for whom Mr. A. E. Withy appeared, was summoned for selling baking powder not of the nature demanded. Mr. Samuel Smith, inspector of food and drugs, said that on February 5 he called in the defendant's shop and purchased three packets of baking powder, for which he paid threepence. Defendant served him, and witness told him his object in purchasing the powders. The samples were divided and defendant given one. The analysis of Dr. Dyer showed the powders to contain alum 22 parts, bi-carbonate of soda 13 parts and farinaceous matter 65 parts. Alum should not be used at all, but tartaric acid, the difference in the cost being that £5 or £6 per cwt. would have to be paid for tartaric acid whilst the same quantity of alum could be obtained for 5s. or 6s.

By Mr Withy: The Act of 1899 first made this an offence. No notice had been given the defendant.

The Bench decided to convict, but only fined the defendant the small penalty of 1s. and costs, owing to the fact that the order had only included baking powder since last year.

Mr. Withy remarked that there was going to be quite an epidemic in the district in regard to baking powder.

The Chairman: Well, we must have proper food.

There was a similar charge against James E. Watts, grocer, of Wootton Bassett, and the Bench dealt with the case in the same way as the last.

At Chippenham, Wilts, on March 1, John Henry Harding, grocer, was charged by Inspector Smith, for the Wilts County Council, under Section 6 of the Act of 1875. Mr. Bevir appeared for the council. Defendant was not legally represented. Mr. Bevir said that Mr. Smith caused to be purchased at the defendant's shop in the market place, Chippenham, a packet of baking powder labelled 'Alpine Baking Powder,' prepared by H. Matthews, of 67 High Street, Plymouth. No doubt Mr. Harding bought and sold the article in question in the ordinary course of trade, but it was sold to the prejudice of the purchaser and was not of the quality demanded. The analysis showed that there was at least 14 per cent of alum in it. The label stated that the article was most nutritious and a great preventative of indigestion, but the analysis proved that to be diametrically untrue. This was not a fancied complaint, but one that went to the root of the case meant to be dealt with by the Act. Baking powder should contain tartaric acid, which cost about £5 per cwt., whilst alum cost about 5s. Mr. Harding admitted selling the powder, but had no idea that it was adulterated, and bought it at a fair commercial price.

The chairman said they would take it that the defendant was ignorant of the ingredients, but he should not sell an article as described unless he got a guarantee. That was the first case that had come before them; but they wished to point out that the whole onus fell on the retailer. For the benefit and protection of the public they were obliged to administer the law, but they would in this case only inflict the mitigated penalty of £3, to include costs.

The injurious nature of alum in baking powders has been fully discussed by my assistant, Mr. A. McGill, B.A., in a report appended hereto. Many of the samples above mentioned were submitted to the district analysts, but a great deal of additional work has been done by Mr. McGill, and a large number of new analyses made. Mr. McGill has described these fully in the same report or in the tables following it. The duplicate samples have been enumerated independently and regarded as separate samples, which they really were, being contained in separate tins. The numbers and descriptions of these, as well as the names of the vendors and manufacturers are given in Table I, which also shows by whom the analyses were made. The results of the analyses have been classified and arranged in the Tables II, III and IV which follow Mr. McGill's report. I beg to recommend the publication of this bulletin.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst

TABLE I.—BAKING POWDERS.

Samples.	Date of Collection.	Quantity Purchased.	Price.	Name of Brand.	Name and Address of — Vendor.	Name and Address of — Manufacturer.	Analyst.
	1899.		$ cts.				
16,734*a*	Sept. 7	3 tins.	0 60	Royal	W. H. Smith, Kentville, N.S.	Royal Baking Powder Co., New York	Bowman.
16,734*b*	" 7	3 "	0 60	"	" "	" "	McGill.
16,735*a*	" 8	3 pkgs. (6 oz.)	0 30	Woodill's German	C. P. Smith, Windsor, N.S.	W. D. Pearman, Halifax, N.S.	Bowman.
16,735*b*	" 8	3 " "	0 30	"	" "	" "	McGill.
16,737*a*	" 11	3 tins, ¾ lb.	0 15	Fairy	W. E. Crowe & Co., Gottingen St., Halifax.	F. C. Howe, Halifax	Bowman.
16,737*b*	" 11	3 " "	0 15	"	" "	" "	McGill.
16,740*a*	" 11	3 "	0 15	Renown	A. M. Boutilier & Co. "	Eastern Chemical Co., Halifax	Bowman.
16,740*b*	" 11	3 "	0 15	"	" "	" "	McGill.
16,741*a*	" 12	3 pkgs	0 21	English Cream	A. L. Doyle & Co., Lower Water St., Halifax	F. F. Dalley Co., Hamilton, Ont.	Bowman.
16,741*b*	" 12	3 "	0 21	"	" "	" "	McGill.
16,743*a*	Oct. 1	3 tins	0 30	Maple Leaf	Mrs. A. Z. Gates, Lunenburg, N.S.	G. A. Parker, Lunenburg, N.S.	Kenrick.
16,743*b*	" 4	3 "	0 30	"	" "	" "	McGill.
17,183*a*	Sept. 19	3 " 3 lbs.	0 75	West End	Hardy & Buchanan, Winnipeg, Man.	The Dyson Gibson Co., Winnipeg, Ont.	Kenrick.
17,183*b*	" 19	3 " "	0 75	"	" "	" "	McGill.
17,184*a*	" 19	3 "	0 60	Climax	T. E. Williams "	R. Ralston & Co., Hamilton, Ont.	Kenrick.
17,184*b*	" 19	3 "	0 60	"	" "	" "	McGill.
17,185*a*	" 19	3 "	0 75	Gold Standard.	Weldon & Co. "	Codville & Co., Winnipeg, Man.	Kenrick.
17,185*b*	" 19	3 "	0 75	"	" "	" "	McGill.
17,186*a*	" 20	3 " 2 lbs.	0 30	White Star	C. Reid & Co. "	The Dyson Gibson Co., Winnipeg	Kenrick.
17,186*b*	" 20	3 " 2 "	0 30	"	" "	" "	McGill.
17,187*a*	" 20	3 " 3 "	0 75	Smith's Cream.	W. J. Smith & Co. "	" "	Kenrick.
17,187*b*	" 20	3 " 3 "	0 75	"	" "	" "	McGill.
17,188*a*	" 20	3 " 3 "	0 75	Hallonquist's Cream	A. Hallonquist "	F. F. Dally & Co., Hamilton, Ont.	Kenrick.
17,188*b*	" 20	3 " 3 "	0 75	"	" "	" "	McGill.
17,189*a*	" 20	3 " 3 "	0 75	Jubilee	A. J. Collin, St. Boniface, Man	" "	Kenrick.
17,189*b*	" 20	3 " 3 "	0 75	"	" "	" "	McGill.
17,190*a*	" 20	3 " 3 "	1 35	Price's Cream	A. Leveque "	Price's Baking Powder Co., Chicago	Kenrick.
17,190*b*	" 20	3 " 3 "	1 35	"	" "	" "	McGill.
17,191*a*	" 20	3 " 3 "	0 60	White Star	C. A. Lavoie "	The Dyson Gibson Co., Winnipeg, Man	Kenrick.
16,191*b*	" 20	3 " 3 "	0 60	"	" "	" "	McGill.
17,192*a*	" 20	3 " 3 "	0 75	Gold Standard.	T. Pelletier "	Codville & Co. "	Kenrick.
17,192*b*	" 20	3 " 3 "	0 75	"	" "	" "	McGill
17,674*a*	" 5	3 " ¾-lb	0 30	Dearborn's Perfect	Dearborn & Co., 75 Prince Wales St., St. John, N.B.	Vendors	Bowman.
17,674*b*	" 5	3 " ¾ "	0 30	"	" "	"	McGill.
17,675*a*	" 5	3 " ¾ "	0 30	Royal	T. E. Williams, 80 Charlotte St., St. John.	Royal Baking Powder Co., New York	Bowman.

17,675*b*	"	5	3 " $\frac{2}{5}$ "	0 30	"	" "	" "	McGill.
17,676*a*	"	5	3 " $\frac{3}{4}$ "	0 60	Cream	McPherson Bros., 181 Union St., St. John	Price's Baking Powder Co., New York	Bowman.
17,676*b*	"	5	3 " $\frac{3}{4}$ "	0 60	"	" "	" "	McGill.
17,679*a*	"	12	3 pkgs	0 75	Magic	Inches & Grimmer, Water St., St. Stephen, N.B.	E. W. Gillett, Toronto	Bowman.
17,679*b*	"	12	3 "	0 75	"	" "	" "	McGill.
17,681*a*	"	14	3 tins, $\frac{3}{4}$-lb.	0 30	Dearborn's Perfect	Burt & Coburn, Fredericton, N.B.	Dearborn & Co., St. John, N.B	Bowman.
17,681*b*	"	14	3 "	0 30	"	" "	" "	McGill.
18,460*a*	Aug.	31	1 lb	0 20	Barley Cream	E. H. Breckenridge, Aylmer, Que.		Valade.
18,460*b*	"	31	1 "	0 20	"	" "		McGill.
18,461*a*	"	31	1 "	0 25	Windsor	A. Z. Trudel, Hull, Que.	Marrotte LeBlanc & Co., Montreal	Valade.
18,461*b*	"	31	1 "	0 25	"	" "	" "	McGill.
18,462*a*	Sept.	1	1 "	0 25	Paradise	G. W. Armstrong, Cornwall, Ont.	W. H. Gillard & Co., Hamilton	Valade.
18,462*b*	"	1	1 "	0 25	"	" "	" "	McGill.
18,463*a*	Aug.	31	1 "	0 25	English Cream	J. E. Chevrier "	F. F. Dalley & Co., Hamilton	Valade.
18,463*b*	"	31	1 "	0 25	"	" "	" "	McGill.
18,464*a*	"	31	1 "	0 25	Kennedy's	J. Kennedy, Druggist, Sparks St., Ottawa	Vendor	Valade.
18,464*b*	"	31	1 "	0 25	"	" "	"	McGill.
18,465*a*	Oct.	7	1 "	0 20	Cook's Friend	Mrs. P. J. Cleary, Nicholas St., Ottawa	W. D. McLaren, Montreal	Valade.
18,465*b*	"	7	1 "	0 20	"	" "	" "	McGill.
18,466*a*	"	7	1 "	0 20	Fanning's Malt	" "	J. J. Fannings & Co., Ltd., Ottawa	Valade.
18,466*b*	"	7	1 "	0 20	"	" "	" "	McGill.
18,467*a*	"	7	½ "	0 25	Royal	Geo. Forde, Rideau St., Ottawa	Royal Baking Powder Co., New York	Valade.
18,467*b*	"	7	½ "	0 25	"	" "	" "	McGill.
18,468*a*	"	7	6 oz.	0 25	Cleveland	C. Waterston, Nicholas St., Ottawa	Cleveland Baking Powder Co., New York	Valade.
18,468*b*	"	7	6 "	0 25	"	" "	" "	McGill.
18,469*a*	Sept.	7	1 lb	0 13	Dairy Cream	J. A. Sweet, 481 Queen St., East Toronto	Prue Gold Mfg. Co., Toronto, Ont.	Ellis.
18,469*b*	"	7	1 "	0 13	"	" "	" "	McGill.
18,470*a*	"	7	1 "	0 10	Daisy	" "	Globe Mills Baking Powder Co., Toronto	Ellis.
18,470*b*	"	7	1 "	0 10	"	" "	" "	McGill.
18,471*a*	"	7	1 "	0 25	Charm	Jas. Cork & Co., 348 Queen St., E. Toronto	Toronto Coffee and Spice Co.	Ellis.
18,471*b*	"	7	1 "	0 25	"	" "	" "	McGill.
18,472*a*	"	7	1 "	0 25	Jersey Cream	W. J. Coutts & Co., 223 Parliament St., Toronto.	Lumsden Bros., Standard Mills	Ellis.
18,472*b*	"	7	1 "	0 25	"	" "	" "	McGill.
18,473*a*	"	7	1 "	0 15	Reliance	W. Roland, York St., Hamilton	Not known	Ellis.
18,473*b*	"	7	1 "	0 15	"	" "	"	McGill.
18,474*a*	"	7	1 "	0 40	Perfection	Galvin Harrigan, Cor. York and Park Sts.	John W. Gerrie, druggist, Hamilton	Ellis.
18,474*b*	"	7	1 "	0 40	"	" "	" "	McGill.
18,475*a*	"	7	1 "	0 15	Champion	C. Lee, 101 King St., Hamilton	F. F. Dally & Co., Hamilton	Ellis.
18,475*b*	"	7	1 "	0 15	"	" "	" "	McGill.
18,476*a*	"	7	3 pkgs., 12 oz	0 30	Cook's Best Friend	Mrs. John McLean, 37 James St., St. Catharines.	W. G. Dunn & Co., Hamilton	Ellis.
18,476*b*	"	7	3 " 12 "	0 30	"	" "	" "	McGill.
18,477*a*	"	7	3 tins 12 "	0 30	Ocean Wave	Flynn Bros., James St., St. Catharines.	Hamilton Coffee and Spice Co.	Ellis.
18,477*b*	"	7	3 " 12 "	0 30	"	" "	" "	McGill.
18,478*a*	"	7	3 " 18 "	0 30	Magic	J. Merriman, St. Catharines	E. W. Gillett, Toronto	Ellis.
18,478*b*	"	7	3 " 19 "	0 30	"	" "	" "	McGill.
19,296*a*	"	6	1 lb	0 15	Barton's P. B.	A. J. Fitzsimmons, Guelph, Ont	Toronto Coffee and Spice Co.	Harrison.
19,296*b*	"	6	1 "	0 15	"	" "	" "	McGill.

TABLE I.—BAKING POWDERS—*Continued.*

Sample.	Date of Collection.	Quantity Purchased.	Price.	Name of Brand.	Name and Address of — Vendor.	Name and Address of — Manufacturer.	Analyst.
	1899.		$ cts.				
19,297*a*	Sept. 6	1 lb	0 30	Mayell's Cream	P. Anderson Guelph, Ont	Mayell & Co., Toronto	Harrison.
19,297*b*	" 6	1 "	0 30	"	" "	" "	McGill.
19,298*a*	" 6	1 "	0 20	Dominion	Jackson & Son., 17 Wyndham St., Guelph	Pure Gold Mfg. Co., Toronto, Ont	Harrison.
19,298*b*	" 6	1 "	0 20	"	" "	" "	McGill.
19,299*a*	" 7	1 "	0 45	Ocean Wave	E. O. Flaherty, Stratford, Ont	Hamilton Spice and Coffee Co	Harrison.
19,299*b*	" 7	1 "	0 45	"	" "	" "	McGill.
19,300*a*	" 7	1 "	0 30	Crystal	The Barnsdale Trading Co., Stratford, Ont	Snow Drift Baking Powder Co., Brantford	Harrison.
19,300*b*	" 7	1 "	0 30	"	" "	" "	McGill.
19,301*a*	" 7	1½ "	0 25	Forest City	A. G. Lloyd, Stratford, Ont	Gorman, Eckert & Co., London, Ont	Harrison.
19,301*b*	" 7	1½ "	0 25	"	" "	" "	McGill.
19,302*a*	" 7	1 "	0 25	Cook's Best Friend	T. A. Rowat, London, Ont	W. G. Dunn & Co., Hamilton	Harrison.
19,302*b*	" 7	1 "	0 25	"	" "	" "	McGill.
19,303*a*	" 7	1 "	0 25	Salvador	J. C. Trebilcock "	Salvador Mfg. Co., London, Ont	Harrison.
19,303*b*	" 7	1 "	0 25	"	" "	" "	McGill.
19,304*a*	" 7	1½ lbs.	0 38	Strong's	Somerville & Co., London, Ont	W. T. Strong & Co., druggist, London	Harrison.
19,304*b*	" 7	1½ "	0 38	"	" "	" "	McGill.
19,564*a*	" 5	3 tins.	0 45	Imperial	W. Briltcliff, 552 St. Antonio St., St. Henri, Que.	E. W. Gillett, Toronto	Edwards.
19,564*b*	" 5	3 "	0 45	"	" "	" "	McGill.
19,565*a*	" 5	3 "	0 25	Eagle	" "	Eagle Baking Powder Co	Edwards.
19,565*b*	" 5	3 "	0 25	"	" "	" "	McGill.
19,566*a*	" 5	3 "	0 45	Gem	A. E. Blanchard, 227 Coursol St., St. Cunegonde, Que.	Hudon & Orsali, Montreal	Edwards.
19,566*b*	" 5	3 "	0 45	"	" "	" "	McGill.
19,567*a*	" 5	3 "	0 45	Royal	G. W. Barsalo, 1067 St. James St., Montreal	Royal Baking Powder Co., New York	Edwards.
19,567*b*	" 5	3 "	0 45	"	" "	" "	McGill.
19,568*a*	" 5	3 "	0 30	Pure Gold	" "	Pure Gold Mfg. Co., Toronto	Edwards.
19,568*b*	" 5	3 "	0 30	"	" "	" "	McGill.
19,569*a*	" 19	2 lbs.	0 27	Crystal	J. R. McOuat, Lachute, Que	" "	Edwards.
19,569*b*	" 19	2 "	0 27	"	" "	" "	McGill.
19,570*a*	" 19	2 "	0 27	Daisy Cream	" "	" "	Edwards.
19,570*b*	" 19	2 "	0 27	"	" "	" "	McGill.
19,571*a*	" 20	2 "	0 21	Kitchen Queen	Josh. Brodeur, 222 Cascade St., St. Hyacinthe, Que.	F. F. Dally & Co., Hamilton	Edwards

19,571*b*	"	20	2 "	0 21	"	" "	" "	McGill.
19,572*a*	"	20	18 oz.	0 24	Newman's	J. Dupont, 233 Cascade St., St. Hyacinthe, Que.	Century Co., Picton, Ont	Edwards.
19,572*b*	"	20	18 "	0 24	"	" "	" "	McGill.
19,573*a*	"	20	2½ lbs.	0 25	Cooks' Pride	T. J. Bourgeois, 203 Cascade St	H. T. Pacaud & Co., Montreal	Edwards.
19,573*b*	"	20	2½ "	0 25	"	" "	" "	McGill.
19,574*a*	"	20	2 "	0 35	Vienna	Pagnuelo Frères, Cascade St., St. Hyacinthe, Que.	S. H. & A. S. Ewing, Montreal, Que	Edwards.
19,574*b*	"	20	2 "	0 35	"	" "	" "	McGill.
19,586*a*	"	12	3 tins.	0 30	Cooks' Favorite	A. A. Cantin, 555 St. Valier, Quebec, Que	J. J. Duffy Co., Montreal	Fiset.
19,586*b*	"	12	3 "	0 30	"	" "	" "	McGill.
19,587*a*	"	12	3 "	0 30	Cooks' Choice	Wm. Treggett, 111 St. John St., Quebec, Que	Pure Gold Mfg. Co., Toronto	Fiset.
19,587*b*	"	12	3 "	0 30	"	" "	" "	McGill.
19,588*a*	"	13	3 "	0 30	Cooks' Delight	J. Raymond & Co., St. Anne de Beaupré	Drouin Frères, New York	Fiset.
19,588*b*	"	13	3 "	0 30	"	" "	" "	McGill.
19,589*a*	"	13	1 lb.	0 30	Pearce	J. A. Moisan, 341 St. John St., Quebec, Que.	Century Co., Picton, Ont	Fiset.
19,589*b*	"	13	1 "	0 30	"	" "	" "	McGill.
19,590*a*	"	13	1 "	0 25	Windsor	" "	Marrotte & Leblanc, Montreal	Fiset.
19,590*b*	"	13	1 "	0 25	"	" "	" "	McGill.
19,591*a*	"	13	3 tins.	0 30	Lily White	J. Picard, 32 Henderson St., Quebec, Que	Bulard et Frère, Quebec	Fiset.
19,591*b*	"	13	3 "	0 30	"	" "	" "	McGill.
19,592*a*	"	14	3 "	0 30	Cooks' Pride	J. P. Guy, 152 St. Joseph St., Quebec, Que.	A. F. Pacaud & Co., Montreal, Que	Fiset.
19,592*b*	"	14	3 "	0 30	"	" "	" "	McGill.
19,593*a*	"	14	3 "	0 30	Eagle	R. McCrae, Main St., Richmond, Que	Eagle Baking Powder Co., Montreal	Fiset.
19,593*b*	"	14	3 "	0 30	"	" "	" "	McGill.
19,594*a*	"	14	3 "	0 27	Cooks' Friend	Grimes & Elliott, Richmond, Que	W. D. McLaren, Montreal, Que	Fiset.
19,594*b*	"	14	3 "	0 27	"	" "	" "	McGill.
19,595*a*	"	14	3 "	0 30	On Top	J. Bedard, Main St., Richmond, Que	Gendron & Denault, Sherbrooke	Fiset.
19,595*b*	"	14	3 "	0 30	"	" "	" "	McGill.
20,143*a*	"	12	12 oz.	0 20	Golden Crown	S. Cobb, Cordova St., Vancouver, B. C.	W. Tufts & Son, Vancouver	Fagan.
20,143*b*	"	12	12 "	0 20	"	" "	" "	McGill.
20,144*a*	"	12	1 lb.	0 25	Kitchen Queen	George Wagg, Water St	F. F. Dalley Co., Hamilton, Ont	Fagan.
20,144*b*	"	12	1 "	0 25	"	" "	" "	McGill.
20,146*a*	"	12	12 oz.	0 25	Magic	Mrs. Stoffard, Abbott St., Vancouver, B.C.	E. W. Gillett, Toronto	Fagan.
20,146*b*	"	12	12 "	0 25	"	" "	" "	McGill.
20,147*a*	"	12	1 lb.	0 25	Purity	C. Uchida, Hastings St., Vancouver, B. C.	Purity B. P. Co., Toronto, Ont	Fagan.
20,147*b*	"	12	1 "	0 25	"	" "	" "	McGill.
20,149*a*	"	12	12 ozs.	0 20	Ocean Wave	Blanchfield & Co., Hastings St., Vancouver, B.C.	Hamilton Coffee and Spice Co	Fagan.
20,149*b*	"	12	12 "	0 20	"	" "	" "	McGill.
20,152*a*	"	12	1 lb.	0 45	Regal	Parrett & Co., Columbia St., New Westminster, B.C.	Pure Gold Mfg. Co., Toronto	Fagan.
20,152*b*	"	12	1 "	0 45	"	" "	" "	McGill.
20,153*a*	"	12	12 oz.	0 25	Blue Ribbon	McKenzie Bros., Columbia St., New Westminster, B.C.	Blue Ribbon Mfg. Co., Winnipeg, Man	Fagan.
20,153*b*	"	12	12 "	0 25	"	" "	" "	McGill.
20,156*a*	"	12	12 "	0 25	White Star	C. A. Welsh, New Westminster, B.C.	The Gibson Co., Winnipeg, Man	Fagan.
20,156*b*	"	12	12 "	0 25	"	" "	" "	McGill.

TABLE I.—BAKING POWDER—*Concluded.*

Sample.	Date of Collection	Quantity Purchased.	Price	Name of Brand.	Name and Address of Vendor.	Name and Address of Manufacturer.	Analyst
	1900.		$ cts.				
A	Feb.			Cleveland's Superior	Bate & Co., Ottawa		McGill.
B	"			Cooks' Friend	" "		"
C	"			Imperial	" "		"
D	"			Kennedy's	J. Kennedy "		"
E	"			Maple Leaf	Kaulbach, M.P. "		"
F	"			Price's Cream	Bate & Co. "		"
G	"			Pure Gold	P. G. Mfg. Co., Toronto		"
H	"			Royal	Bate & Co., Ottawa		"
I	"			Cream			"
K	Mar.			Regal	Parnell & Gunn, New Westminster, B. C.		"
L	"			Fanning's Malt	Bate & Co., Ottawa		"
M	"			Regal	Pure Gold Mfg. Co., Toronto		"

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, March 20, 1900.

THOS. MACFARLANE, Esq., F.R.S.C., &c.,
Chief Analyst.

SIR,—I have the honour to submit you herewith a report of work upon 168 samples of baking powder, collected as shown in Table I. In the work of analysis I have received assistance from the different public analysts, as indicated in the tabulated results; but the greater portion of the work has been done in this laboratory. In a part of the work, and especially in an examination into the accuracy of methods for alumina and phosphoric acid estimations, I have during the last week or two received valuable assistance from Mr. F. Connor, analytical chemist of this city.

The samples are classified as follows :—

Cream of tartar powders, Table II	54
Alum powders, Table III	31
Alum and phosphate powders, Table IV	83
	168

Explanatory notes as to methods of analysis accompany the tables so that only some general remarks are called for here,

I believe that in judging of a baking powder the following points should be considered, and I name them in what I conceive to be the order of their importance :—

1. The wholesomeness of the materials used in the powder, both with regard to their characteristics individually and to the nature of the residues which they leave in the bread.
2. Efficiency as gas producers, having regard not only to the total quantity of gas which is evolved, but also to the conditions of temperature, moisture and time as affecting gas production.
3. Keeping qualities.

In Bulletin 10 of this department, published in June, 1889, I expressed my conviction, based on experimental evidence at that time available, that alum in baking powders is dangerous to health.

The large mass of evidence which has since accumulated on this question, has, if possible, more strongly convinced me of the correctness of the opinion I expressed eleven years ago. A very much condensed synopsis of this evidence, with references to the original memoirs, will be found in the following pages :—

In judging of the wholesomeness of a baking powder, I am convinced that it is not enough to prove the harmlessness of the residues left in the bread on the assumption that a perfect chemical reaction has taken place during the making and baking of the dough. The components of baking powders are sparingly soluble in water, and the conditions of cooking require the use of a limited and a variable amount of water, according to the judgment of the cook; so that, I think, we assume too much in supposing that the unchanged components of the powder are never present, as such, in the finished product. Hence the importance of assuring ourselves that these components are, in themselves, not dangerous to health. The importance of this matter appears very great when we further consider that in order to a complete reaction of the components of the powder, not only must they be completely got into solution by the water (or milk) used in making the dough, but they must be present in the baking powder itself in exactly equivalent proportions. This assumes that the manufacturer took care to prepare his powder upon scientific principles, using properly proportioned ingredients, and thoroughly mixing these together, and also that no separation of these ingredients has since taken place. I have determined the relative densities of maize starch (= 1·47), cream of tartar (= 1·87), commercial burnt alum (= 2·103)—see Table V., No. 14—and bi-carbonate of soda (= 2·179.) It will be seen that gravity can exert but little influence in separating alum and carbonate of soda ; but there will be a decided tendency for the starch—which forms about 50 per cent of these powders—to come to the top of the can.

With regard to the baking powders enumerated in Table II., the wholesomeness, both as regards the components themselves, and the residues left in the bread, may be taken as well established. The use of cream of tartar (or tartaric acid) with bicarbonate of soda long ante-dates the commercial baking powder. It is further to be noted that cream of tartar (and tartaric acid) react in a perfectly definite way with bi-carbonate of soda. It is therefore an easy thing for the manufacturer of a tartar baking powder to guarantee to his customers a mixture which shall contain no excess of either acid or basic component, and which shall, in consequence, leave a perfectly neutral residue in the bread. It is quite otherwise with burnt alum, as the following experiments, made with a commercial sample will shew. (See Table V., No. 14.)

On titrating this sample to neutrality (using phenolphthalein as indicator) the following results were obtained. The first neutralization was effected by adding normal soda to a cold solution of the alum until a colour was obtained which persisted for one minute. The subsequent neutralizations were made by adding considerable excess of soda, boiling for the time specified, and titrating back with normal acid :—

Burnt Alum.	100 Grammes.	
Conditions.	Required Normal Soda.	Equivalent Bi carbonate of Soda.
Cold	616	51·7
Boiled 1 minute	1208	101·5
" 6 "	1484	124·7
" 11 "	1628	136·8
" 16 "	1676	140·8
" 21 "	1724	144·8

These numbers sufficiently illustrate the indefiniteness of this reaction, and the impossibility of deciding exactly how much soda shall be used in an alum powder, to secure a neutral residue in the bread. The last column gives the number of parts by weight of bi-carbonate of soda, which are required for neutralization of 100 parts by weight of the alum sample, and it is evident that in order to ensure the probable absence of alum, as such, in the bread it becomes necessary to use a considerable excess of bicarbonate of soda. Every chemist knows the difficulty of titrating to definite neutrality, burnt alum and soda ; and, if instead of using an indicator, like phenolphthalein, we attempt to determine the neutral point by causing burnt alum to react with carbonate of soda until carbon dioxide ceases to be evolved, the exact end of the reaction is still difficult to fix. This is due to the very difficult solubility of burnt alum, and especially to the great insolubility of those basic sulphates of alumina always found in it. But if it be difficult to fix the end of the reaction when large excess of boiling water is the solvent, it is infinitely more difficult to say how far the reaction will be carried in the case of dough-making, where cold water in limited quantity is the solvent. On reference to the appended tables it will be seen that the amount of gas liberated in a well made tartar powder by addition of acid to the residue left on boiling the sample with water, is seldom more than one per cent, and is usually less than this. In alum and alumphosphate powders it may reach five per cent, or even more, showing a very large excess of bicarbonate of soda in the sample. But even this number does not define the practical excess of soda, since the conditions under which the 'available' gas is given off in the laboratory test are far more favourable to the reaction of the acid and basic components of the powder than are the conditions occurring when dough is made. It follows from these considerations that we should expect to find more or less unchanged alum in the bread made from an alum powder. There are obvious difficulties in the way of experimentally demonstrating this point. Attempts to get this residual alum into solution without at the same time getting the much more soluble residual soda into solution, have proved but partially successful, and it follows that the interaction of the components of the powder, so far as this was incomplete in the making and baking of the bread, is completed in the stomach of the consumer of the bread. A disturbance of gastric digestion would seem to be inevitable, since if alum is in excess, its well known inhibitory action upon the digestive ferments will be exhibited, while, if a large excess of bi-carbonate of soda is present, this will go to neutralize the natural acidity of the gastric juice and cannot but prove harmful. It is evident that experimental proof of the point I have suggested, namely, the presence of unchanged alum in the bread, would render illegal the sale of alum baking powders in those countries (England, France, Germany, etc.), where laws against the presence of alum in bread have been enacted. The failure to convict on appeal in the celebrated Norfolk case (Warren *vs.* Phillips, 1880) resulted from the failure to prove that alum existed in the bread, as such; even the experts called for the defence being careful to state that they did not wish their evidence to be construed as favourable to the harmlessness of alum in food. What these chemists claimed was that alum did not exist in the bread—although it was present in baking powder—being changed into hydrate of alumina, a substance which they believed to be non-injurious to health.

The question of the harmlessness of hydrate of alumina has, however, not been proven; and the most that can be said for it is that the case is still unsettled. I may say here that my personal opinion is decidedly against the use of alum. The health of a nation is too serious a matter to be imperilled lightly, and if it be impossible to secure prohibitory legislation against alum baking powders, it is all the more desirable that manufacturers of these powders should be required to state their composition on the packages, so that consumers may know what they buy and use. Until it is demonstrated that hydrate of alumina and (in the case of alum-phosphate powders) phosphate of alumina are harmless substances in food, the use of alum baking powders is attended with a very serious risk; while not even the proving of these substances harmless would establish the safety of these powders, since, for reasons already mentioned, it is quite uncertain that the reaction is completed in the bread, and the sulphate of soda (Glaubers Salt) which is formed as a second product of decomposition, is a powerful purgative whose continued use cannot be conceived to be without injurious consequences upon the stomach and intestinal canal.

That the state of the case for alum baking powders may be intelligently considered by readers of this bulletin, I append a synopsis of such scientific evidence in the matter as has come under my notice during the interval of eleven years which have elapsed since my last published work on baking powders. (See Bulletin 10, of this Department.)

In the Norfolk Baking Powder case (1879) the powder in question consisted of rice flour, 41·5 per cent, burnt alum, 15·76 per cent, and bicarbonate of soda (with traces of impurities) 42·74 per cent. Mr. J. W. Knights, F.C.S., and Professor M. M. P. Muir, of Caius College, Oxford, and three medical men were called for the prosecution, and affirmed their belief in the harmfulness of this powder. For the defence were called Mr. F. Sutton and Dr. Beverley, who claimed that the powder was harmless on the ground of the insolubility of hydrate of alumina. A fine was imposed, but the case was appealed. On appeal, the Recorder held that the law against alum in food required the prosecutors to prove that in the baking powder itself the alum was mixed with food, and, on this technicality, the appeal was quashed, since it was held that only after its use in baking was the article mixed with food, and then the alum, as such, was no longer present, having been changed into hydrate of alumina. During this trial the following gentlemen were called by the prosecution :—J. W. Knights, Professor Muir, Dr. Bbury and Dr. Paget; for the defence, Mr. Sutton, Dr. Thudichum and Dr. Tidy. Although men of high standing were called for the defence, and a decision favourable to the manufacturer was obtained, I do not think that this case throws more than incidental light upon the important question of the safety, or otherwise, of alum baking powder.

Professor Patrick, of the University of Kansas (*Scientific American Supplement*, No. 185) made experiments to determine the solubility of hydrate of alumina in the gastric juice by feeding biscuits made with an alum baking powder to cats, killing these after different intervals of time and examining the contents of the stomachs and intestines for dissolved alumina. He found none. On feeding unbaked (gelatinous) alumina however, he found it to go into solution, and concludes that it is not safe to eat *dough* made with alum powder, "it should always be baked." Also "if bread is carelessly mixed, or with insufficient water, some of the powder may remain dry, and the alum not be changed to hydrate, in which case the effect would probably be injurious." On feeding biscuits which had been purposely made with but little water, and imperfectly baked, Prof. Patrick found dissolved alumina in every case, and suggests that as a simple precaution in the use of alum powder, it might be well to mix the batter too thin at first, and stiffen it by the addition of pure flour. Of course if these special precautions are desirable with alum powders, it is of great importance that these powders be distinctly labelled as containing alum.

Professor Ruttan, of McGill College, Montreal, has published (*See* 'Transactions of the Royal Society of Canada, 1887) the results of a series of experiments on the digestibility of bread baked with alum and other powders. The following are his conclusions :—

1. Bread made with tartrate powders is most quickly digested, because the Rochelle salts formed possess a very weak retarding action on ferments.

2. The presence of alkaline sulphates and of the pulpy viscid hydrate and phosphate of alumina among the other decomposition products, is sufficient to explain the relative indigestibility of bread containing these salts.

3. Soluble phosphates do not appear to seriously interfere with the proper action of digestive ferments.

4. While the effect of alum is to entirely prohibit ferment action, that of the products resulting from the use of an alum powder is merely to retard digestion, not entirely to prevent it.

5. The unanimous verdict of my experiments is that alum powders introduce into a form of food of universal use, agents which are detrimental to the functional activity of the digestive ferments. They must therefore be prejudicial to health, and the only course is to carefully avoid them.

J. West Knights, F.C.S., (*The Analyst*, 1880, p. 67), published the results of a series of experiments to determine the influence of alum upon the digestibility of gluten. He reaches the following conclusions :—

1. Gluten, after treatment with alum, or insoluble salts of alumina, is less soluble than ordinary gluten in the gastric juice, by about one-half. Whether the alumina is in a soluble or an insoluble form seems to have no great influence in its effects upon the gluten.

2. Bread made with yeast was one-third more soluble in gastric juice than bread made with an alum baking powder.

3. Alum has a very marked influence upon the conversion of starch by diastase.

4. This powerful action of mere traces of alum or salts of alumina upon soluble gluten and diastase is, I think, sufficient foundation upon which to assert that alum either in a soluble form or mixed with carbonate of soba, is injurious to health when introduced into bread; the extent of the injury may or may not be small.

H. A. Mott (*Journal of the American Chemical Society*, vol. II) describes experiments made upon dogs fed with biscuits prepared from alum baking powder. Sickness and vomiting, followed by constipation were well marked in each case, where five dogs were experimented upon. Three dogs fed with biscuits made with the same amounts of cream tartar powder, "ate well and were not in any way affected."

Hydrate and phosphate of alumina were mixed with meat, and finally burnt alum with meat. In every case sickness, trembling and loss of appetite resulted, and the meat was vomited in an undigested condition. Gastric juice from healthy dogs was used in the digestion of fibrin and albumen (white of an egg, boiled). These dissolved completely, but on repeating the experiment after addition of hydrate of alumina and phosphate of alumina, digestion was either very much delayed or entirely prevented.

Dr. Charles F. Chandler, of Columbia College, in the case of Mott *vs.* Burns, speaks thus (*See The Analyst*, vol. VI., p. 91) :—'There is an injurious constituent left after the mixture of alum and bicarbonate of soda in a baking powder. I think it is dangerous to the digestive organs and liable to produce serious disturbance of the liver of the individual making use of such powders.'

Henry Morton, president of Stevens Institute, testified, in the same case :—'I took a portion of this (alum) powder and mixed it with flour in the directed proportions, and baked a small loaf with it, then I soaked this loaf in cold water and made an extract in which I readily detected alumina in a soluble condition.'

Dr. S. W. Johnson, professor of Chemistry, at Yale, and Prof. Raymond, of Brooklyn, testified to the harmful character of alum baking powders.

Otto Hehner (*Analyst*, vol. XVII., p. 201) publishes a long series of experiments upon the influence of alum and the residues of an alum baking powder on digestion. A solution of pepsin was used, and experiments were made with egg albumen, wheat flour, milk and bread.

In the case of egg albumen Mr. Hehner finds that 'alumed baking powder is quite as injurious as alum itself.'

In the case of digestion of flour 'alum has a most injurious influence, while the influence of alumed baking powder is slight.'

In bread, he concludes, 'with small amounts the influence of alum and of alumed baking powder is equal, but with larger quantities the alum acts more detrimentally than does the baking powder.'

In the case of milk 'the alumed baking powder exerts a more injurious influence than does the amount of alum contained in it.'

Mr. Hehner made physiological tests on himself and three assistants, and states his conclusions as follows :—

'Alum baking powder exerts a most injurious influence upon digestion, whether artificial or within the body ; the presence of alum in baking powder must be regarded as an adulteration injurious to health. The sodium bicarbonate contained in the powder does not neutralize the objectionable qualities of the alum.'

W. D. Bigelow and C. C. Hamilton (*Journal American Chem. Soc.* xvi, 587-597) have published a long series of experiments upon the double digestion of the gastric and pancreatic ferments. They conclude :—

1. That the influence of alumed flour on the digestion is over-estimated, since the albuminoids not digested by the pepsin are almost all digested by the alkaline pancreatic solution.
2. That the influence of aluminum hydroxide on digestion is about the same as that of an equivalent quantity of alum. The action of the phosphate is quite different, for in spite of frequent statements as to its insolubility, the preceding results show that from 10 to 12 per cent of the albuminoids which are digestible in presence of aluminum hydroxide and alum, are insoluble in the presence of an equivalent quantity of aluminum phosphate.

Prof. Mallet of the University of Virginia has made an extended series of digestion experiments, the results of which are published in the *Chemical News*, 1888. His conclusions are summarized as follows :—

(*a.*) The greater part of the alum baking powders in the American market are made with alum, the acid phosphate of calcium, bicarbonate of sodium and starch.

(*b.*) These powders, as found in retail trade, give off very different proportions of carbonic acid gas, and therefore require to be used in different proportion with the same quantity of flour, some of the inferior powders in largely increased amounts to produce the requisite porosity in bread.

(*c.*) In these powders there is generally present an excess of the alkaline ingredient, but this excess varies in amount, and there is some times found on the contrary an excess of acid material.

(*d.*) On moistening with water, these powders, even when containing an excess of alkaline material, yield small quantities of aluminum and calcium in a soluble condition.

(*e.*) As a consequence of the common employment of calcium acid phosphate along with alum in the manufacture of baking powders these, after use in bread-making, leave at any rate most of their aluminum in the form of phosphate. When alum alone is used the phosphate is replaced by hydroxide.

(*f.*) The temperature to which the interior of bread is exposed in baking does not exceed 212° F.

(*g.*) At the temperature of 212° F. neither the 'water of combination' of aluminum hydroxide nor the whole of the associated water of either this or the phosphate is removed in baking bread containing these substances as residues from baking powder.

(*h.*) In doses not very greatly exceeding such quantities as may be derived from bread as commonly used aluminum hydroxide and phosphate produce, or produced in experiments upon myself, an inhibitory effect upon gastric digestion.

(*i.*) This effect is probably a consequence of the fact that a part of the aluminum unites with the acid of the gastric juice and is taken up into solution, while at the same time the remainder of the aluminum hydroxide or phosphate throws down in insoluble form the organic substance constituting the peptic ferment.

(*k.*) Partial precipitation in insoluble form of some of the organic matter of food may probably also be brought about by the presence of the aluminum compounds in question.

(*l.*) From the general nature of the results obtained the conclusion may fairly be deduced that, not only alum itself, but the residues which its use in baking-powder leaves in bread, cannot be viewed as harmless, but must be ranked as objectionable, and should be avoided when the object aimed at is the production of wholesome bread.

Finally, I may quote the conclusions of C. A. Crampton, Assistant Chemist to the Department of Agriculture at Washington. (*See* Bull. 13, 1889.)

(1.) That form of alum powder in which sufficient phosphate is added to combine with all the aluminium present, is a better form, and less apt to bring alum into the system than where alum alone is used.

(2.) It must be expected that small quantities, at least, of alum will be absorbed by the digestive fluids, when any form of powder containing it is used.

(3.) Whether the absorption of small quantities of alum into the human system would be productive of serious effects, is still an open question, and one that careful physiological experiment alone can decide.

In regard to the first of Mr. Crampton's conclusions I may remark, that it is evidently based on the assumption that phosphate of alumina is harmless. This, however, cannot be accepted as a proven fact. On the contrary, the experiments of Bigelow and Hamilton, of H. A. Mott and others, show phosphate of alumina to be quite as dangerous as the hydrate, or even alum itself.

I have made experiments to determine whether aluminium hydrate would react with soluble phosphates under the conditions of normal gastric digestion. I have proved that when pure hydrate of alumina is shaken for some time with a neutral solution of phosphate of soda, the insoluble alumina can be washed nearly free from phosphoric acid; but if the solution of phosphate of soda be acidified with hydrochloric acid to the extent of 0·2 per cent (i.e. to the acidity of gastric juice), a residue remains which cannot be washed free from phosphoric acid, showing that phosphate of alumina has been formed, and proving the solubility of precipitated alumina in the gastric juice. A saturated solution of calcium phosphate in 0·1 per cent hydrochloric acid gave a like result. This result is corroborative of the work of other experimenters; and its importance lies in that it demonstrates the fact of the removal of soluble phosphates from the food, and thus produces phosphorous starvation in the animal economy. So that if we overlook the possible presence of unchanged alum, in the residues from use of an alum powder, and suppose hydrate of alumina alone to be found as the result of its decomposition, we are yet forced to grant the harmful tendency of this residue since the acidity of the gastric juice is sufficient to determine its reaction with the phosphates of our food.

Both hydrate of alumina and phosphate of alumina are gelatinous, viscid precipitates and the former is often used as a means of entangling and throwing down as so-called 'lakes,' the organic matters which give colour to wines, syrups, etc. The same property of alumina causes it to be used in clarifying water which, like that of the Ottawa River, contains much organic matter in solution and suspension. This mechanical action of the hydrate of alumina is not to be overlooked as among its objectionable features. The soluble matter contained by the stomach after eating is eminently such an emulsion as would be affected by hydrate of alumina, and it is inevitable that nutritious matter and the peptic ferments should be entangled and precipitated by the pulpy hydrate.

'*Burnt alum*' of commerce has a very indefinite composition. Crystallized ammonia alum contains 47·67 p.c. of water, potash alum contains 45·57 p.c., and sulphate of alumina contains 48·66 p.c. The operation of 'burning' is intended to drive off the whole or a portion of this water in either of the above named salts, although in strictness only the first two are alums. In practice it is difficult, if not impossible, to dehydrate the alum without causing a loss of more or less of the sulphuric acid which is combined with alumina. Local super-heating is unavoidable, and the result is that some lumps are more fully burnt than others. A sample of so-called *Anhydrous* alum, which nevertheless retained more than half of its water of crystallization, was used in the following experiments :—

—	Acidity per 100 grammes	SO_3	Al_2O_3
	c. c.	p. c.	p. c.
1st lump	736	35·95	12·39
2nd "	886	41·80	13·70
3rd "	708		
4th "	722		
Mean	763	38·88	13·10

These results show how very unequally the different lumps had been affected in the kiln. And although less than half of the water had been driven off, a distinct loss of sulphuric acid had occurred. An average sample of the alum gave 25·72 per cent potassium sulphate, and a calculation based upon the potash contained in it, shews it to have been a potash alum, burnt to a loss of 28·6 per cent of weight, of which loss 23·7 is water and 4·9 sulphuric acid. Some further studies in the effect of burning ammonia and potash alums, and sulphate of alumina are given in Table V., and I think that the want of definiteness in the reaction between burnt alum and soda is a weighty argument against the use of burnt alum in baking powders.

Many of the alum and phosphate powders (*see* Table IV) are effectively alum powders, since the alumina is in excess of that required to combine with the phosphoric acid present. P_2O_5 and Al_2O_3 combine in the ratio 71 : 51 by weight, or, in round numbers the alumina requires one and four-tenths ($1\frac{4}{10}$) its weight of phosphoric acid to convert it into phosphate. A study of Table IV., shews that of the 32 brands there recorded, five brands, viz. :—Crystal, Choice Crystal, Dairy Cream, Dominion and Regal, are essentially alum powders, since the alumina is in excess of the phosphoric acid, and the acidity of the powder is almost entirely due to the sulphuric acid it contains. Of the remaining 27 brands, eighteen (18) viz. :—Barton's, Blue Ribbon, Cook's Choice, Cook's Delight, Cook's Favorite, Daisy, Eagle, Forest City, Golden Crown, Jersey Cream, Lily White, On Top, Paradise, Purity, Smith's Cream, West End, White Star and Windsor, contain sufficient phosphoric acid to convert theoretically all the alumina into phosphate. Did such conversion into phosphate take place, it would render the alumina insoluble, and incapable of affecting soluble phosphates in food, and in the opinion of C. A. Crampton (see p. 17), would make these powders safer in use than others of their class. The experiments of Bigelow and Hamilton, however, go to prove that phosphate of alumina is quite as objectionable as other alumina compounds, being as effective, or even more so, in rendering albuminoids indigestible, so that these powders cannot be regarded as certainly less dangerous to health than are the straight alum powders.

The considerable proportion of acid phosphate of lime added to the brands just named, may have been so added for the purpose of ensuring the conversion of all the alumina into phosphate, in accordance with Mr. Crampton's suggestion. It is more likely, however, that acid phosphate is added in order to have a quick acting acid in the powder. Superphosphate of lime is much more soluble than burnt alum, and ensures a quicker production of gas. Indeed, it is the extreme solubility of superhosphate of lime which makes it unsatisfactory when used with bicarbonate of soda alone. The whole of the soda is apt to be decomposed before the bread is baked sufficiently hard to remain porous, and it collapses before the hardening stage. If this difficulty with acid (or super) phosphate could be overcome the article would certainly answer the purpose of a wholesome substitute for cream of tartar. As a partial substitute for the latter it is sometimes used, but no sample of baking powder has come into the hands of our collectors, where superphosphate has been used without alum. One Canadian manufacturer has given me a sample of such a powder which he has made for some years past. It was found to have the following composition :—

Maize starch	40·0	per cent.
Cream of tartar	25·6	"
Bicarbonate of soda	24·5	"
Acid phosphate of lime, &c., by difference	9·9	"
	100·0	
Available gas	12·02	per cent.
Residual	0·80	"
Total	12·82	

It is evident that this powder is both efficient and wholesome. I cannot speak of its keeping qualities.

I have also examined samples of acid phosphate of lime as prepared for baking powder manufacture. The available acidity of these samples is given in Table V, Nos. 20 to 25. Mixtures with indicated proportions of bicarbonate of soda, did not possess good keeping qualities; the loss of gas-producing power amounting to over 25 per cent in 20 days. I have no doubt that the difficulties attending the use of acid phosphates will ultimately be overcome by changes in the method of manufacture, or by the use of other than the calcium phosphates. So far as their physiological qualities are concerned, no objection can be found to them.

The efficiency of a baking powder depends upon (1) the volume of gas which it produces, (2) the rate of evolution of the gas. For evident reasons the last named condition is as important to the production of light and spongy bread as the first. It might be inferred that the rate of decomposition of bicarbonate of soda in solution would be entirely determined by the solubility of the acid substance made to react with it, but the following experiments show this not to be the case, at least, so far as decomposition in the cold is concerned. Bicarbonate of soda (0·5 gramme, dissolved in 50 cc. water) was made to react with a slight excess of the acid component, presented to it in powder as a dry cartridge and shaken into solution during one minute. Suitable arrangements for adjusting pressure and temperature were provided, and the evolved gas collected over water saturated with CO_2. Theoretically, 143 cc. of gas should have been obtained, if the bicarbonate had been completely decomposed. The mean results of many tests gave :—

With crystallized ammon. alum	102 cc.
" tartaric acid	94 "
" leached acid phosphate of lime	70 "
" partially burnt alum	63 "
" cream of tartar	49 "

The relative solubilities of the substances named are in the following order :—

100 parts water at 20° C, dissolve.

Tartaric acid	100 parts.
Ammonia alum	13·7 "
Burnt alum	6·6 "
Acid phosphate lime	4·0 "
Cream tartar	0·5 "

The most notable exception is the case of tartaric acid, which although seven times as soluble as alum, was less prompt in effecting the decomposition of bicarbonate of soda. But while crystallized alum is very prompt to react with bicarbonate of soda, partially dehydrated alum is very much slower in its reaction, and, by inference, well burnt alum might be expected to approach cream of tartar in this regard. It is this slowness to react with bicarbonate of soda in the cold which gives to cream of tartar, and to burnt alum, their value as components of baking powder from the point of view of efficiency. Tartaric acid reacts too quickly, and acid phosphate of lime resembles it in this respect.

It will be seen, by reference to table V, that a maximum gas-producing power exists for every combination of bicarbonate of soda with an acid substance like cream of tartar, alum, &c.

The calculated percentage numbers given in the table are based upon the production of a neutral residue in the bread, *i.e.*, the whole of the carbonate of soda is supposed to be decomposed and the soda to remain in combination with tartaric or other acid, as the case may be. It will be seen that the highest gas-producing power which can be given to such a mixture of bicarbonate of soda with cream of tartar is 16·2 per cent by weight, and this assumes the cream of tartar to be chemically pure bi-tartrate of potash. The ordinary cream of tartar of commerce contains more or less tartrate of lime, as well as traces of sulphate, both of which substances reduce its value as a component of baking powder. In the case of such a mixture as above suggested, the proportions of cream of tartar and bicarbonate of soda are 69 and 31 ; or, approximately, 2 to 1. This is the proportion in which cooks generally use these materials, and when they are mixed for immediate use, very good results may be expected. But in order that the mixture may possess keeping qualities, experience has shown that it is necessary to mix in some neutral substance, like starch or flour, known as a *filler*, and from 15 to 20 per cent—preferably the last named percentage—has been found effective. The introduction of such a filler necessitates the lowering of the gas-producing power of the mixture, and the table shows that with 19·7 per cent of starch the maximum gas-producing power of a genuine cream of tartar powder is 13 per cent, and the possession of such a high strength as this necessitates the use of a chemically pure bi-tartrate of potash by the manufacturer.

An examination of Table II will show that the only entirely cream of tartar powders which come up to this standard are Cleveland's Superior, containing 18 per cent of starch (mean of two samples), and the Royal Baking Powder, containing 18·2 and 18·5 per cent of starch (two samples). In Dearborn's Perfect (one sample) the standard is reached by reducing the starch to 15 per cent; in Kennedy's (one sample) by reducing the starch to 6 per cent, and in Strong's (one sample) by reducing the starch to 7·4 per cent. These are all excellent powders, and the only injury that can result from a reduction of the starch percentage is a *pari-passu* reduction of the keeping qualities. It will be further seen from Table V that a very much larger gas production can be secured by the use of free tartaric acid. Indeed, the strength of 13 per cent gas can be reached by a tartaric acid powder containing as much as 53·2 per cent of starch. It follows, that by a judicious admixture of free tartaric acid with cream of tartar, a genuine tartar powder may be made to have a much higher leavening power than if made with cream of tartar only. Powders of this type (see Table II) are Cream, Maple Leaf, Price's Cream and Pure Gold. From the point of view of efficiency and wholesomeness, a mixed cream of tartar and free tartaric acid powder doubtless reaches the highest perfection attainable. Whether a mixture containing a still higher proportion of free tartaric acid, and consequently, a higher gas-producing power, than any of those named, could not be made consistently with good keeping qualities, I cannot say. It may be that in these powders the highest practical efficiency has been reached; but I am inclined to think that, by taking especial care to use dry materials, the gas-producing power could be still further increased without injury to the keeping quality. Since, however, the cream of tartar powder has been longer in use than any other, its maximum strength (13 per cent of gas) forms a sort of standard which has been accepted by cooks; and the manufacturers of powders who use other materials than cream of tartar find it best not to depart too far from this standard.

Again referring to Table V, we see that the gas yield of burnt alum is a very variable quantity (Nos. 3 to 19, and No. 27) but always much higher than that of cream of tartar, and sometimes even exceeding that of tartaric acid. In consequence of this fact it is easy to make a high grade of alum powder, which yet consists very largely of starch. Reference to Table III will show that most of the alum powders contain from 25 to 50 per cent of starch. Some of them have a very high efficiency, notably Nos. 18 and 19, while in others the total gas-producing power is much higher than that available under ordinary conditions of dough-making. As a rule these powders contain a large excess of soda, see Nos. 3, 5, 12, 30, &c., but, of course, the amount of this excess of soda which remains as carbonate in the bread will to some extent depend upon the conditions under which the baking is done.

The amount of sulphuric acid (SO_3) found in these powders varies from about 8 to as high as 20 per cent, and although, in a general way the efficiency varies as the percentage of sulphuric acid, this is not invariably true. The reason is that only such portion of the acid as is combined with alumina is available for decomposition of bicarbonate of soda. Some of the samples of burnt alum of commerce (see No. 12 and 14 in Table V) seem to be little else than dehydrated sulphate of alumina; and ammonia alum may be so burnt as to leave little else than sulphate of alumina, since the ammonium salt is wholly volatile. When potash alum is burnt, of course the sulphate of potash remains as such, and the acid contained in it is not available in liberating carbonic acid gas. Taking number 12 as an example of an average commercial burnt alum we see that a baking powder, having 13 per cent of gas-producing efficiency, could be made from it by admixture of 54·4 per cent of starch. Such a powder would contain only 20·7 per cent of the burnt alum, representing 13·2 per cent of sulphuric acid. With a burnt alum of still higher acidity, e. g., Nos. 5 or 19, a still lower percentage would be needed. But, it is to be noted that these acidity determinations are based upon titration with soda in hot water solution, and are no doubt considerably in excess of the practicable acidity of the same samples, under the conditions of dough making and baking. It will be seen, however, by reference to table III, that wherever the sulphuric acid content of an alum powder is markedly below 13 per cent, the gas-producing power of the powder is correspondingly reduced. A higher percentage of SO_3 is not necessarily attended with an increase in the efficiency of the powder for reasons already given.

Acid phosphate of lime as prepared for baking powder manufacture, has an acidity not greatly differing from that of cream of tartar (See Nos. 20 to 25 in Table V.) the natural acidity of the salt being reduced by addition of starch, or by the sulphate of lime produced as a by-product in the manufacture of the article. I have already spoken of the desirability of this substance as a component of baking powder. It is, unfortunately, found to be unavailable for the same reasons that make free tartaric acid unavailable. It is too soluble, and reacts too quickly, in the cold, with the bicarbonate of soda. It is, however, quite possible to use it, as tartaric acid is used, partly to replace the cream of tartar, and I have already referred to one sample furnished by a maker of such a baking powder. This powder does not seem however, to be widely known, and no samples of it came into the hands of our food inspectors. The acid phosphate of lime is very largely used along with burnt alum, in order to furnish a quick-reacting ingredient of these powders ; and it is the source of the phosphoric acid in the powders, (83 samples) enumerated in Table IV. In admixture with cream of tartar I do not know that any exception, on the ground of wholesomeness, could be taken against phosphate of lime. It is quite otherwise in admixture with alum. In this case the phosphoric acid probably remains in the bread combined with alumina, and not with soda ; and the insoluble phosphate of alumina, as already shown, has a distinctly harmful effect upon digestion. Of the 83 samples in Table IV, eleven contain less than 3 per cent of phosphoric acid—most of these less than 2 per cent—and they are to be regarded as alum powders, in effect. In the others, the alum is still the effective acid agent, except at the commencement of reaction. These powders, in few cases only, come up to the efficiency of tartar powders, and their average efficiency is below that of the straight alum powders.

	Baking Powders.		
	Tartar.	Alum.	Alum Phosphate.
Average efficiency	11·7	10·3	8·7
Maximum efficiency	15·6	18·3	12·4

With regard to the keeping qualities of the baking powders examined, it is sufficient to say that the cream of tartar powders, as a rule, keep well with about 20 per cent of starch. When free tartaric acid, in not too large proportion, is present, the result shows good keeping qualities, with from 20 to 30 per cent of starch. Where tartaric acid in the free state, is the main acid ingredient, of course a high percentage of starch is possible—see Nos. 24 to 26, and 49 and 50—and this seems to answer its purpose very well. Alum powders naturally keep well, the difficult solubility of the burnt alum and the large amount of starch both being favourable to this end. The alum phosphate powders show more marked deterioration from keeping ; e.g. Nos. 9, 10, 39, 70, 71. The last two are exceptional, as containing tartaric acid equivalent to about 12 per cent of cream of tartar.

The following notes on methods of working may prove useful to analytical chemists who are called upon to deal with baking powders.

Starch.—The direct estimation of the starch by the use of solvents for the other constituents of the powder, and the weighing of the starch on a tarred filter, as described more fully in note to Table II, is much more expeditious than the method by conversion to sugar and the use of Fehling solution, and is equally trustworthy and accurate. Where a residue of alumina or basic sulphates of alumina remains with the starch, a correction can easily be applied.

Organic Acids.—In cream of tartar and tartaric acid powders the estimation is easy, and may be made either by burning the carefully neutralized powder and titrating the resulting carbonates, or by precipitating the (concentrated) solution from starch estimation, with potassium acetate and acetic acid and addition of alcohol. I find the first named method to be more satisfactory and trustworthy, although if proper care as to details is taken, the results by the precipitation method may be very good. The mechanical shaker can be used to advantage in bringing about the separation of the bi-tartrate of potash.

The estimation of tartaric acid in mixtures of tartrates with burnt alum and phosphates of lime, is by no means an easy one. The amount of error, when the ignition method is used, may reach 6 per cent (calculated to bi-tartrate of potash) when burnt alum is present, and may be nearly twice as large with acid phosphate of lime. These are the extremes found in actual examination of mixtures of known composition ; the error is usually about 3 to 4 per cent. See Bull. 26, p. 20. The difficulty lies in exactly neutralizing the burnt alum and in bringing about a definite combination in the case of the phosphate. The question of neutralizing alum has already been discussed. (See p. 12, *ante.*) Neither Rosolic acid nor cochineal are satisfactory indicators with orthophosphoric acid. Phenolphthalein is the only indicator which works with any certainty, so far as I know. To this indicator, di-sodium hydrogen phosphate is neutral in cold solution ; in hot solution, however, the mono-sodium phosphate reacts neutrally ; but free acid is developed as the solution cools, when the di-sodium salt is found in solution. If, however, calcium sulphate is present, as in straight phosphate (see Nos. 20 and 21 in Table V), acidity continues to be developed on boiling, and if soda is added to neutralize this, a neutral phosphate is formed which does not decompose on cooling the solution. Further investigation of this reaction is required, and I have a series of experiments in progress, which, I hope, will explain it. I mention the reaction in this connection as throwing light upon the very irregular results obtained with mixtures of tartrates and phosphates.

The only accurate way of getting at the tartaric acid in phosphate powders is by precipitating the acid in combination with potash as bi-tartrate. Only one brand of the alum phosphate powders collected on the market gave more than a trace of tartaric acid. (See Nos. 70 and 71 in Table IV.)

Alumina.—This estimation presents no difficulties in the case of straight alum powders. The alumina which results from over-burning the alum is often so difficultly soluble in dilute hydrochloric acid that as much as 1 to 1·5 p. c. of Al_2O_3 may be found in the starch. Occasionally, but rarely, a trace of sulphuric acid remains undissolved, being combined as basic sulphate of alumina. In alum phosphate powders the estimation of alumina is much more tedious. In 1888 I worked out a method, which was published in Bull. 25 (see p. 23 et seq.), which consisted essentially in adding a known excess of phosphoric acid and throwing down the normal phosphate of alumina in acetic acid solution, subsequently estimating residual phosphoric acid with uranium solution. The method was not recommended so much on the ground of extreme accuracy as on account of its expeditiousness, combined with such a degree of accuracy as made it satisfactory for this kind of work. I have caused the method to be examined independently by Mr. Connor, of this city, and I subjoin his report upon it, as well as parallel determinations in certain baking powder samples, where the method of adding a known amount of ferric oxide, throwing out all of the phosphoric acid and alumina, with ammonia, and determining the phosphoric acid in another portion of the sample by molybdate, has been used to check the acetic acid method.

Mr. Connor writes as follows :—'I herewith desire to report the results of my examination of the uranium method, as described in Bulletin 26, I. R. Dept., for determination of alumina and phosphoric acid in baking powder materials.

Briefly the uranium method consists in precipitating the alumina wholly as phosphate, in acetic acid solution, by adding an excess of a standard phosphate solution previous to precipitation and weighing the precipitate for the alumina estimation. The excess of phosphate carried into the filtrate is estimated by titration with uranium solution, the phosphoric acid in the sample being got at by subtracting the amount added from the total phosphoric acid contained in the precipitate (calculated) and in the filtrate by titration.

The results of my examination of the above method are :—

1. As to the best method of using the potassium ferrocyanide for the detection of excess of uranium solution. The powdered crystals placed on porcelain gave very satisfactory results, and are preferable to a solution of ferrocyanide.

In four solutions, each containing fifty cc. of a microcosmic salt solution, I treated with uranium solution, and obtained results as follows :—

	Ferrocyanide.	
	Crystals.	Solution.
	cc.	cc.
(a) Containing 5 c.c. sod. acetate	20·1	20·1
(b) " 10 "	20·1	No colour at 20·1
(c) " 15 "	20·1	20·6
(d) " { 5 " / 10 HCl., neutralized by ammonia	20·1	20·7

(2) As to the separation of the alumina phosphate from the lime contained in the baking powder solution :—

If this separation is not made correctly lime phosphate may be weighed along with the alumina phosphate, giving it a false value. I found that at boiling temperature, the acetic solution would separate phosphate of lime along with alumina phosphate ; but if the temperature of the solution is kept at about 80°C. for about ten minutes the lime is very largely prevented from co-precipitation. I worked as follows :—

To fifty cc. of the dilute hydrochloric acid solution of the baking powder (representing one gramme of the sample) I added five cc. of sodium acetate solution (1 : 10), made the solution alkaline to litmus paper, acidified with 1 cc. glacial acetic acid and stirred. The solution was then heated on the sand bath to 80° C. for ten minutes, allowed to settle, filtered and washed with hot water. 75 cc. of wash water will carry all excess of phosphate into the filtrate, which is then heated and titrated. The precipitates are washed further, till free from chlorides, ignited and weighed, neglecting, of course, to save the additional filtrates.

As a check upon the results obtained by the above method, I used, for determination of phosphoric acid its separation by ammonium molybdate (as is shown under my remarks on method of checking alumina results), titration of the ammonium molybdate, with standard caustic potash, and titrating back the excess of potash with standard nitric acid, a method for phosphoric acid which gives everything that could be desired as to accuracy and speed.

For the determination of alumina I added an excess of a standard solution of ferric chloride to the hydrochloric acid solution of the sample, and precipitated together all the iron, alumina and phosphoric acid in the solution, free from lime. I operated as follows :—The hydrochloric acid solution of the baking powder, after the addition of sufficient ferric chloride to colour the precipitate brown (5-10 cc. of a solution containing 0·1732 ferric oxide in 10 cc. was found sufficient) is made alkaline to litmus paper, in the cold, with ammonia, and then three to four drops, in excess of acetic acid are added, boiled three minutes, let settle, filtered and washed with hot water, ignite and weigh the precipitate—total P_2O_5, Al_2O_3, Fe_2O_3. The Fe_2O_3 being known, the sum of P_2O_5 and Al_2O_3 is also known. After weighing, this precipitate is dissolved in 5 cc. strong HCl by boiling for about ten minutes ; 25 cc. HNO_3 are then added, and the boiling continued till nitrous fumes disappear. This solution is then treated for phosphoric acid as described above.

The following conclusions seem to be justified :—

1. The Uranium method must be worked carefully, with the precautions noted, or the result cannot be reliable.

2. The titration of excess of P_2O_5 has to be done slowly and with care.

3. The phosphoric acid determination by the molybdate check method is quickly performed (using asbestos for filtering) and the titration is very simple, using phenolphthalein.

4. As to the alumina determination by the iron method, the addition of excess of ferric chloride makes a bulky precipitate, which, however, is easily washed (using boiling water), and requires less time than the corresponding precipitation and washing by the uranium method.

The following tabulation of results by both methods shews how they have worked in my hands :—

Samples of Baking Powder.	P_2O_5.		Al_2O_3.	
	Uranium Method.	Iron Method.	Uranium Method.	Iron Method.
Sample (a)	1·26	1·33	4·38	3·75
" (b)	5·27	5·25	3·30	4·04
" (c)	4·74	4·63	3·10	3·53
" (d)	4·60	4·82	2·05	1·96
Means	3·97	4·01	3·21	3·32

I may add to the above the following results obtained by Mr. Connor by the iron method, and by Miss Tyrrell, of this laboratory, with the uranium method :—

Samples of Baking Powder.	P_2O_5.		Al_2O_3.	
	Uranium Method.	Iron Method.	Uranium Method.	Iron Method.
Sample (e)	1·91	2·08	3·69	2·94
" (f)	5·28	4·80	4·32	4·90
" (g)	4·91	4·97	3·65	3·10
Means	4·02	3·95	3·89	3·65

It will be seen that the differences are sometimes of excess, and sometimes of deficiency, so that, in a series of determinations they nearly balance each other. I am inclined to agree with Mr. Connor that, taking everything into consideration, the iron method is to be recommended in preference to the uranium method; although, with due care on the part of the analyst, the latter may give sufficiently good results, and, for a long series of determinations, has the advantage of requiring less time.

One other point strikes me, namely : the fact that the presence of traces of phosphate of lime in the precipitate of phosphate of alumina, would affect the accuracy of the alumina estimation very much more than that of phosphoric acid, since the molecular weights of $Ca_3\ (PO_4)_2$ and $Al_2\ (PO_4)_2$ are as 310 : 244 ; while the apparent alumina would be increased by the total weight of lime in the precipitate. It is noteworthy that the mean Al_2O_3 by uranium is 3·50, while that by iron is 3·46 ; which goes far to demonstrate the very slight source of error from imperfect separation of lime.

Ammonia alum seems to be much less used than formerly in the alum powders. In 1888 I found most of the alum to contain ammonia. In this examination 33 samples have been examined for ammonia, and only two of these gave any considerable amounts of it. Both were straight alum powders, and gave results as follows :—

Sample 19,592 *(b.)* . . . . 6·07 ammonia sulphate.
" 19,566 *(b.)* . . . . 7·52 " "

Five other samples gave traces of ammonia.

The low percentage of sulphuric acid present in many of these powders, together with the fact that recently, imported samples of burnt alum containing only traces of alkali have come under my notice, leads me to infer that burnt sulphate of alumina is taking the place of burnt alum properly so called, This gives a higher efficiency to the article, and no objection holds against its use as compared with alum, provided the pure sulphate is employed by the roaster. Separation from mother-liquors as alum crystals ensured the purity of the raw material in a way which the use of the difficultly crystallizable sulphate of alumina can scarcely be said to do.

I have the honour to be, sir,

Your obedient servant,

A. McGILL.

TABLE II.—BAKING POWDERS consisting essentially of Cream of Tartar, Tartaric Acid, Bi carbonate of Soda, and Starch.

Serial Number.	Departmental Number or Letter.	Name.	Starch.—See Note 1.	Carbonic Acid Gas. Available. See Note 2	Carbonic Acid Gas. Total. See Note 3	Cream of Tartar. See Note 1.	Bi-carbonate of Soda. See Note 5. Approximate by difference.	Bi-carbonate of Soda. See Note 5. Available from CO_2.	Excess of bi-carbonate soda.—See Note 4.	Bi-carbonate soda calculated from total CO_2. See Note 5.	Remarks. See Note 6.	Analyst.
1	18468a	Cleveland's Superior			....	55·27	......		....	....	Maize starch, and a little wheat. A good powder, and apparently keeps well.	Valade.
2	18468b		18·2	12·6	13·6	......	......	24·1	.....	26·0		M.
3	A		17·1	13·3	14·3	56·02	26·28	25·1	1·2	27·3		M.
		Means	17·7	13·0	14·0	55·61	26·28	24·7	1·2	26·6		
4	18465a	Cook's Friend. ...	32·2	8·2	8·9	....	.....	15·6	...	17·0	Contains rice flour as filling. The first four samples appear to have been injured by keeping.	Valade.
5	18465b		30·2	10·4	10·7	46·06	23·71	19·9	0·4	20·5		M.
6	19594a		35·1	9·4	...	41·40	23·50	17·9	....	..		Fiset.
7	19594b		35·5	9·2	9·5	42·11	22·39	17·6	0·0	18·4		M.
8	B		30·0	12·8	14·1	46·62	23·38	21·4	0·7	26·9		M.
		Means	32·6	10·0	10·8	44·05	23·26	19·1	0·4	20·6		
9	17676a	Cream	30·3	10·3	10·8	45·39	24·31	19·6	.....	20·6	Maize starch. Contains part of the tartaric acid in free state. The first sample has deteriorated. A good powder.	Bowman.
10	17676b		28·1	13·3	14·3	46·81	25·09	25·2	1·9	27·3		M.
11	1		28·8	13·3	14·9	....	....	25·2	...	28·4		M.
		Means..	29·1	12·3	13·3	46·10	24·70	23·3	1·9	25·5		
12	17674a	Dearborn's "Perfect"	15·6	10·3	12·0	52·64	31·76	19·6	...	22·9	Contains maize starch. The first sample shows deterioration by keeping. Contains a decided excess of bi-carbonate soda. Is a good powder.	Bowman.
13	17674b		...	13·3		......	.....	25·4	...	......		M.
14	17681a		14·7	11·0	14·8	......	......	20·9	...	28·2		Bowman.
15	17681b		15·1	10·8	14·3	57·15	27·75	20·8	3·7	27·3		M.
		Means	15·1	11·3	13·7	54·90	29·75	21·7	3·7	26·1		
16	16737a	Fairy.	19·2	11·0	12·5	49·78	31·02	21·0	...	23·9	Maize starch. A good powder...............	Bowman.
17	16737b		22·0	12·6	13·8	54·52	23·48	24·1	2·7	26·4		M.
		Means............	20·6	11·8	13·1	52·15	26·25	22·5	2·7	25·1		

18	19564a	Imperial	......	....	....	......	....	.. ..	.. ..	.. .	Maize starch. The samples examined appear to have been injured by keeping. A slight deficiency of soda.	Edwards.
19	19564b		17·8	9·8	....	57·15	25·05	18·7	0·0	..		M.
20	C		17·8	10·0	10·8	57·53	24·67	19·1	0·0	20·6		M.
		Means	17·8	9·9	10·8	57·34	24·86	18 9	0·0	20·6		
21	18464a	Kennedy's	16·6	....	..	61·29	22·11	...	....	...	Maize starch. Contains 1·87 per cent lime (CaO) equivalent to about 12 per cent of calcium tartrate. No. 23 gave only 14 9 per cent CO_2 on analysis six weeks later.	Valade.
22	18464b		...	11·7	13·0	....	....	22·4	4·4	21·8		M.
23	D		6·0	15·6	16·9	63·92	30·08	29·7	3·9	32·2		M.
		Means	11·3	13·6	15·0	62·60	26·10	26·1	4·1	28·5		
24	16743a	Maple Leaf	41·3	13·5	15 6	Tartaric acid. 22·3	36·4	25·7	..	29·8	Contains wheat flour as filling. The tartaric acid is chiefly in the free state. Is a very efficient powder, containing a decided excess of bi-carbonate soda.	Bowman.
25	16743b		35·9	14·9	.....	28 4	35·7	28·4	4·7			M.
26	E		....	14·2	17·1	28·4	......	27·1	...	32·6		M.
		Means	38·6	14·2	16·3	26·4	36·0	27·1	4·7	31·2		
27	18474a	Perfection	8·3	11·6	12·4	62 44	29·26	22·2	.....	23·6	Maize starch. Contains 1·71 per cent CaO – equivalent to 11·1 per cent calcium tartrate.	Ellis.
28	18474b		9·0	12·5	13·8	63·17	27·83	23·8	2·5	26·3		M.
		Means	8·7	12·0	13·1	62·80	28·60	23·0	2·5	25·0		
29	17190a	Price's Cream	21 2	11·8	13·0	50·50	28·30	22·6	.....	24·9	Maize starch. Contains part of the tartaric acid free. An excellent powder.	Kenrick.
30	17190b		20·2	14·6	15·6	51·70	28·10	27 8	1·8	29·9		M.
31	F		20·1	14·8	16·0	54·33	25·57	28·3	1 5	30·5		M.
		Means	20·5	13·7	14·9	51·51	27·32	26·2	1·7	28·4		
32	19568a	Pure Gold	19·3	.....	...	....	....	.....	.	.....	Maize starch. A good powder. A trace of free tartaric acid.	Edwards.
33	19568b		21·2	10·4	12·4	54·71	24·09	19·9	1·2	23·7		M.
34	G		20·1	13·9	15·4	55·77	24·13	26·5	0·5	29·4		M.
		Means	20·2	12·2	13·9	55·26	24·11	23·2	0·9	26·6		
35	20152a	Regal	20·8	....	9·7	......	......	..	.	18·3	Maize starch. A slight deficiency of soda. Contains 1·3 per cent calcium tartrate.	Fagan.
36	20152b		20·3	11·5	11·9	56·96	22·66	21·9	0·2	22·8		M.
37	K		20·2	10·8	11·3	56·40	23·40	20 6	0·2	21·6		M.
		Means	20·4	11·2	11·2	56·68	23·03	21·3	0·2	21·0		
38	16740a	Renown	27·5	11·4	12·8	..	......	21·7	.....	24·4	Maize starch. A good powder. Contains a trace of free tartaric acid.	Bowman.
39	16740b		29·6	12·0	13·7	47·00	23·4	23·0	3·1	26·2		M.
		Means	28·6	11·7	13·3	47·00	23·4	22·4	3·1	25·3		

TABLE II.—BAKING POWDERS consisting essentially of Cream of Tartar, Tartaric Acid, Bi-carbonate of Soda, and Starch—*Concluded.*

Serial Number.	Departmental Number or Letter.	Name.	Starch—See Note 1.	Carbonic Acid Gas. Available. See Note 2	Carbonic Acid Gas. Total. See Note 3	Cream of Tartar. See Note 4.	Bi-carbonate of Soda. See Note 5. Approximate by difference.	Bi-carbonate of Soda. Available from CO_2.	Excess of bi-carbonate soda.—See Note 4.	Bi-carbonate soda calculated from total CO_2. See Note 5.	Remarks. Note 6.	Analyst.
40	16734a	Royal	19·2	11·9	12·6	53·58	27·22	22·7		24·0	Maize starch. An excellent powder.	Bowman.
41	16734b		.....	13·0	...	.....	.....	24·8	0·7			M.
42	17675a		19·0	11·1	11·8	52·64	28·36	21·2	.....	22·5		Bowman.
43	17675b		...	12·4	13·2	54·71	......	23·7	1·3	25·2		M.
44	18467a		....	..	.	52·29	....	.	..	....		Valade.
45	18467b		18·2	13·3	14·1	55·08	26·72	25·4	1·8	27·0		M.
46	19567a		19·3	......	....	.....	......	...	....	.....		Edwards.
47	19567b		18·4	11·6	13·2	55·08	26·52	22·2	2·0	25·1		M.
48	11		18·5	13·9	15·3	54·71	26·79	26·5	1·7	....		M.
		Means	18·8	12·5	13·4	54·01	27·21	24·5	1·5	26·2		
						Tartaric acid.						
49	19303a	Salvador	47·3	8·8	.....	23·3	29·4	16·8	.....	.	Maize starch. Tartaric acid chiefly free. Contains a marked excess of bi carbonate soda.	Harrison.
50	19303b		46·9	9·9	12·9	25·1	28·0	18·9	7·5	24·5		M.
		Means	47·1	9·4	12·9	24·2	28·7	17·9	7·5	24·5		
51	19304a	Strong's	7·0	12·1	.....	64·39	28·61	23·7	..	..	Maize starch. Contains 1·98 p.c. lime, equivalent to nearly, 13 p.c. calcium tartrate. No. 52 gave 12·2 p.c. CO_2 after six weeks keeping.	Harrison.
52	19304b		7·4	13·1	14·8	61·66	30·94	24·9	3·4	28·3		M.
		Means	7·2	12·7	14·8	63·02	29·82	24·3	3·4	28·3		
53	16735a	Woodill's German	33·5	7·7	9·5	33·45	33·05	14·6	.....	18·2	Contains wheat flour. Samples much deteriorated by keeping.	Bowman.
54	16735b		37·2	9·1	10·7	39·86	22·94	17·3	3·5	20·3		M.
		Means	35·4	8·4	10·1	36·65	28·00	16·0	3·5	19·3		

Notes to Table II.

1. The starch, in these samples, has been determined as follows :—10 grammes are treated with 150 cc. cold water, containing about 5 per cent of strong ammonia solution, and shaken—by machinery—for one hour. The starch is collected on a tared filter, and washed till neutral. The filter and contents are dried in warm air (40° to 50° C.), and then allowed to stand at the ordinary temperature of the laboratory, exposed to air, before weighing, to take up normal moisture. The purity of the starch is ensured by examining it with the microscope. The results are accurate to within one (1) per cent where a purified starch has been employed in manufacture. Where flour has been used, an error of from 3 to 5 per cent is probable.

2. The amount of so-called *available* gas furnished by a baking powder, is to some extent dependent upon the method employed in making this determination. No laboratory method has been devised which can be said to exactly imitate the conditions obtaining in the oven. It is probable that most of our methods indicate a somewhat higher yield than is obtained by the cook. So long, however, as the same mode of operating is maintained throughout a series of tests, the results will be strictly comparable among themselves. My method of working is as follows :—A cartridge of 4 grammes of the sample is introduced into a dry flask of 200 cc. capacity, fitted with a funnel tube reaching nearly to the bottom, and connected with a series of U tubes for drying and absorbing the gas. An aspirator draws carbonic acid free air through the whole apparatus, and measures the volume of this air. 100 cc. cold water is passed into the flask, through the funnel tube, and heat applied to a vessel of water, in which the flask is immersed. This is so arranged as to reach the boiling point in about 10 minutes, and the duration of the test is about 25 minutes during which time 15 litres air are drawn through. A back flow condenser interposed between the flask and the first tube prevents steam from passing over. Soda lime is used to absorb the gas, and the efficiency of the apparatus has been amply established.

A formula for soda lime, which has given special satisfaction, will be found in the Journal Am. Chem. Soc., Vol. xxi., p. 396.

It will be observed that the percentage of gas obtained is, in some cases, considerably higher than corresponds to the available acid of the sample. This is because bi-carbonate of soda gives off part of its gas spontaneously under the conditions of the test. The following experiment will illustrate this. A mixture was made, of pure materials, as follows :—

Cream tartar	54·5 p.c.
Bi-carbonate soda	29·0 "
Maize starch	16·5 "
	100·0

This mixture contains 15·2 per cent of CO_2 of which the bi-tartrate of potash should set free 12·7 per cent. Experiment gave 14·05 per cent available.

3. The residue in the flask is treated with dilute sulphuric acid, and the evolved gas is added to the so-called 'available'.

4. Five (5) grammes of the sample is weighed into a beaker of 300 cc. capacity, and 100 cc. water added. When effervescence has subsided, 5 cc. normal sulphuric acid is added, to decompose any excess of carbonate. The solution is boiled to get rid of CO_2, phenolphthalein added, and normal soda to neutralize. The difference between the volume of soda required and that of sulphuric acid added gives data for calculation of excess of bi-carbonate of soda present in the sample above that which combines with the tartaric acid present. (See column 10 of table.) The neutralized solution is evaporated to dryness in platinum, and the residue charred to convert tartrates into carbonates. The charred mass is extracted with hot water, and a definite volume (excess) of normal sulphuric acid—usually 35 cc. is sufficient. The filtrate is boiled to drive off CO_2, and titrated back with normal soda. From the data so obtained the total tartaric acid is calculated. In column 7 of the table this is stated, for the most part, in terms of bi-tartrate of potassium ; in those samples (Maple Leaf and Salvador brands) in which most of the acid is free, it is stated as such. Of course, the presence of any free acid in the sample (Cream and Price's Cream) will cause an apparent increase in the cream of tartar, in the ratio 94:75. The error is not great, however, where only a few units per cent of free acid are present. The tartaric acid present as calcium tartrate, will thus be calculated to cream of tartar, and make the percentage of acid potassium tartrate seem out of proportion to the efficiency of the sample. This is the case with the following brands, viz.:—Kennedy's, Perfection and Strong's, in which a low grade of cream of tartar, containing from 11 to 13 per cent of tartrate of lime has been used. In most of the samples, however, very pure cream of tartar has been used, and only traces of lime are found in any of these samples, other than the three brands named above.

5. Errors in starch and cream of tartar determinations will, of course, enter into the difference numbers given in the first of these columns, so that the figures given are only approximations to the truth. The second column gives bi-carbonate of soda corresponding to the available carbonic acid, as given in column 5. When this differs materially from that given in column 11, it will be found that bi carbonate of soda is considerably in excess of cream of tartar (or tartaric acid) in the sample. This is further corroborated by the figures given in column 10.

6. In conclusion it may be said that none of the samples enumerated in this table can be objected to on the ground of healthfulness. Most of them are excellent powders, and any differences in efficiency are offset, at least to some extent, by differences in cost. Exception might be taken to the excess of soda in some of the samples—e. g. Nos. 15, 22, 23, 36, 49, 51—and particularly to No. 47—but this is a matter of taste on the part of the consumer. Perhaps objection might be taken to the large percentage of lime salts in Nos. 21, 22, 23, 27, 28, 48 and 49. But, although calcium tartrate is a useless component of baking powder, it cannot be said to be dangerous to health.

Most of the samples show good keeping qualities. Where deterioration is indicated I have noted it in column 12.

Table III.—Alum Baking Powders.

Serial Number.	Departmental Number or Letter.	Name.	Starch.—See Note 1.	Sulphuric Acid SO_3.	Alumina Al_2O_3—Note 2.	Undetermined.—Note 3.	Carbonic Acid Gas.—Note 5. Available.	Carbonic Acid Gas.—Note 5. Residual.	Carbonic Acid Gas.—Note 5. Total.	Bi-carbonate Soda. Note 4. Available.	Bi-carbonate Soda. Note 4. Total.	Remarks.	Analyst.
1	18460a	Barley Cream	38·8	16·96	6·09	38·15	13·3	1·3	14·6	25·4	27·9	Maize flour. CaO 0·53 p.c. Contains a trace of ammonia alum 132 p.c. $(NH_4)_2SO_4$	Valade.
2	18460b		36·5	16·24	5·00	42·26	13·9	0·6	14·5	26·6	27·8		M.
		Means	37·7	16·60	5·55	40·20	13·6	1·0	14·6	26·0	27·9		
3	18475a	Champion	...	13·32	...	......	8·0	4·1	12·1	15·3	23·1	Maize starch	Ellis.
4	18475b		50·2	12·33	4·50	32·97	..	...	12·6	......	24·2		M.
		Means	....	12·82	......	......	...	....	12·4	...	23·7		
5	18476a	Cook's Best Friend	58·8	9·30	2·35	28·24	7·0	3·6	10·6	13·4	20·3	Samples 18476a and b contain 1·31 per cent. of P_2O_5. Maize starch.	Ellis.
6	18476b		52·8	6·83	2·22	38·14	......	...	.....	...	....		M.
7	19302a		55·3	9·61	3·20	31·89	10·5	...	......	20·1	...		Harrison.
8	19302b		56·5	7·76	2·20	33·51	.....	.	10·2	.....	19·5		M.
		Means	55·8	8·38	2·50	32·95	8·8	....	10·4	16·8	19·9		
9	19573a	Cook's Pride	.....	...	....	....	8·5	....	...	16·2	...	Sample 19573b contains 0·4 p. c. P_2O_5. Maize starch. 19592b is made with ammonia alum and yielded ammonia equivalent to 6·07 p.c. $(NH_4)_2SO_4$.	Edwards.
10	19573b		48·4	11·20	3·69	36·49	12·0	0·9	12·9	22·9	24·5		M.
11	19592a		53·1	16·83	5·90	24·17	8·5	...	.....	16·2	.....		Fiset.
12	19592b		53·0	12·26	4·05	30·69	9·0	3·3	12·3	17·2	23·5		M.
		Means	51·5	13·43	4·55	30·45	9·5	2·1	12·6	18·1	24·0		
13	16741a	English Cream	51·3	.....	....	......	10·0	0·7	10·7	19·1	20·4	18463a and b contain, respectively, 1·38 and 1·31 p. c. P_2O_5. Maize starch.	Bowman.
14	16741b		48·4	12·41	4·11	35·08	.....	.	.....	......	..		M.
15	18463a		55·8	8·47	.....	......	5·8	1·9	7·7	11·1	14·6		Valade.
16	18463b		50·6	7·72	3·34	37·03	.	...	11·5	...	22·0		M.
		Means	51·5	9·53	3·73	36·06	7·9	1·3	10·0	15·1	19·0		

17	18466*a*	Fanning's Malt	26·4	...	...	...	...	...	...	...	...	Maize starch	Valade.
18	18466*b*		24·4	20·60	7·05	47·95	18·1	1·7	19·8	34·5	37·8		M.
19	L		25·0	20·20	7·36	46·44	18·3	...	...	35·0	...		M.
		Means	25·3	20·4	7·20	47·20	18·2	...	...	34·8	...		
20	19566*a*	Gem	36·7	...	...	...	6·7	...	...	12·8	...	Maize starch and wheat flour. 19566*b* gave ammonia=7·52 p. c. $(NH_4)_2SO_4$.	Edwards.
21	19566*b*		35·7	22·9	7·85	33·55	8·6	0·6	9·2	16·4	17·5		M.
		Means	36·2	...	...	...	7·7	...	...	14·6	...		
22	17188*a*	Hallonquist's Cream	52·4	11·50	4·37	31·73	11·2	1·0	12·2	21·4	23·2	Maize starch. Contains ammonia=0·89 p. c. $(NH_4)_2SO_4$.	Kenrick.
23	17188*b*		48·0	12·98	3·70	35·32	...	...	...	...	...		M.
		Means	50·2	12·24	4·04	33·52	...	...	...	...	...		
24	17189*a*	Jubilee	53·4	13·61	4·25	28·74	10·9	1·7	12·6	20·8	24·2	Maize starch	Kenrick.
25	17189*b*		51·7	10·34	3·95	34·01	...	...	...	...	...		M.
		Means	52·5	11·98	4·10	31·38	...	...	...	...	...		
26	19571*a*	Kitchen Queen	50·0	...	...	...	10·7	...	...	20·5	...	Maize starch	Edwards.
27	19571*b*		49·0	12·79	...	...	10·8	0·2	11·0	20·5	20·8		M.
28	20144*a*		...	12·10	...	...		...	9·7	...	18·5		Fagan.
29	20144*b*		52·1	11·88	4·05	31·97	10·6	1·2	11·8	20·3	22·5		M.
		Means	50·4	12·26	...	...	10·7	0·7	11·4	20·4	20·6		
30	18473*a*	Reliance	...	13·97	6·70	...	7·3	1·4	11·7	14·0	22·4	Maize starch	Ellis.
31	18473*b*		50·4	13·25	4·00	32·35	...	...	...	...	...		M.
		Means	...	13·61	5·35	...	...	...	...	...	...		

1. Starch has been separated by shaking, in cold solution, with 3 p. c. hydrochloric acid. Separated starch has been examined with the microscope as to kind and purity. Mineral matter found as 'ash,' on burning the starch, has been deducted from the 'crude starch.' This ash is invariably found to be alumina, rendered insoluble by the process of burning the alum.

2. This is the alumina found in solution, corrected by addition of alumina found in the separated starch.

3. In this figure are included bi-carbonate of soda, potash (soda or ammonia) present as sulphate, lime and moisture.

4. This does not necessarily account for all the bi-carbonate of soda originally present in the sample, but only for such part of it as has not been spontaneously decomposed since manufacture.

5. For method of valuing gas-producing power, see Notes 2 and 3 to Table II.

TABLE IV.—ALUM PHOSPHATE BAKING POWDERS.

Serial Number.	Departmental Number or Letter.	Name.	Starch.—See Note 1.	Phosphoric acid P_2O_5.	Sulphuric acid SO_3.	Alumina Al_2O_3.	Undetermined.—See Note 2.	Carbonic Acid Gas. See Note 3.			Bi-Carbonate of Soda. See Note 4.		Remarks.	Analyst.
								Available.	Residual.	Total.	Available.	Total.		
1	19296a	Barton's	52·2	4·67	8·92	2·75	31·16	10·6	...	...	20·2	...	Maize starch. CaO 1·9 p. c.	Harrison, M.
2	19296b		48·0	5·12	9·37	2·91	34·57	...	...	...	...	...		
		Means	50·1	4·90	9·15	2·85	33·01	...	...	...	...	...		
3	20153a	Blue Ribbon	45·9	4·94	12·40	...	...	...	...	8·1	...	15·5	Maize starch	Fagan, M.
4	20153b		46·5	5·48	10·89	3·63	33·50	9·1	1·1	10·5	18·0	20·0		
		Means	46·2	5·21	11·64	3·63	33·32	...	...	9·3	...	17·8		
5	18471a	Charm	54·7	2·72	10·79	4·20	27·59	8·1	2·4	10·5	15·4	20·1	Maize starch	Ellis, M.
6	18471b		48·9	5·98	10·86	3·32	30·97	...	...	...	...	...		
		Means	51·8	4·35	10·82	3·76	29·28	...	...	...	...	...		
7	17184a	Climax	47·1	3·85	14·29	3·43	31·33	9·9	1·1	11·0	18·9	21·0	Maize starch	Kenrick, M.
	17184b		45·6	4·61	14·11	...	...	...	...	...	...	...		
		Means	46·3	4·23	14·20	...	...	...	...	...		...		
9	19587a	Cook's Choice	49·4	6·77	13·98	4·23	25·62	2·9	...	...	5·5	...	Maize starch	Fiset, M.
10	19587b		44·8	6·30	12·76	4·14	32·00	2·7	2·9	5·6	5·2	10·7		
		Means	47·1	6·54	13·37	4·19	28·81	2·8	...	...	5·4	...		
11	19588a	Cook's Delight	44·7	6·83	10·35	3·92	34·20	6·9	...	...	13·2	...	Maize starch	Fiset, M.
12	19588b		42·6	5·70	8·36	2·21	41·13	6·9	3·0	9·9	13·2	23·1		
		Means	43·7	6·26	9·36	3·07	37·66	6·9	...	...	13·2	...		

13	19586a	Cook's Favourite	61·3	5·17	10·09	3·03	20·41	9·3			17·8		Maize starch	Fiset.
14	19586b		60·6	4·82	6·60	1·96	26·02	9·1			17·5			M.
		Means	61·0	5·00	8·35	2·50	23·22	9·2			17·7			
15	19300a	Crystal	50·2	2·10	12·61	3·66	31·43	11·5			22·0		Maize starch. CaO = 0·85 p.c. Is essentially an alum powder.	Harrison.
16	19300b		50·0	1·91	11·16	3·59	33·24							M.
		Means	50·1	2·01	11·89	3·68	32·33							
17	19569a	Choice Crystal	35·8		18·8			9·7					Maize starch. Is essentially an alum powder.	Edwards.
18	19569b		38·3	1·3	19·2	3·75	37·45	11·5	0·6	12·1	21·9	23·0		M.
		Means	37·1		19·0			10·6						
19	18469a	Dairy Cream	45·3	2·17	19·56	3·70	29·27	8·7	1·9	10·6	16·6	20·3	Maize starch. Is essentially an alum powder.	Ellis.
20	18469b		39·9	2·86	19·80	4·77	32·67							M.
21	19570a							8·4			16·1			Edwards.
22	19570b		38·8	1·19	20·2	4·35	35·46	11·2	0·6	11·8	21·3	22·4		M.
		Means	41·3	2·07	19·85	4·27	32·47	9·5	1·3	10·8	18·0	21·4		
23	18470a	Daisy	50·4	6·14	12·39	3·80	27·27	6·3	4·6	10·3	12·7	19·7	Maize starch	Ellis.
24	18470b		45·5	7·48	13·25	3·93	29·84							M.
		Means	48·0	6·81	12·82	3·87	28·56							
25	19298a	Dominion	43·0	1·55	17·30	3·22	34·93	10·6			20·2		Maize starch. CaO = 4·6 p. c. Is essentially an alum powder.	Harrison.
26	19298b		40·5	2·17	17·50	4·30	35·53							M.
		Means	41·8	1·86	17·40	3·76	35·23							
27	19565a	Eagle	39·6					8·3			15·9		Maize starch	Edwards.
28	19565b		43·1	4·91	13·77	3·65	34·57	9·1			17·3			M.
29	19593a		44·5	5·43	14·75	4·09	31·23	9·4			17·9			Fiset.
30	19593b		44·8	5·00	12·10	3·10	35·00	7·3	3·3	10·6	13·9	20·2		M.
		Means	43·0	5·11	13·54	3·61	33·60	8·5			16·2			
31	19301a	Forest City	47·0	4·84	12·27	3·07	32·82	12·4			23·7		Maize starch. CaO = 2·3 p. c.	Harrison.
32	19301b		46·2	5·25	10·30	4·04	34·21			14·2		27·1		M.
		Means	46·6	5·05	11·29	3·56	33·52							

TABLE IV.—ALUM PHOSPHATE BAKING POWDERS—*Continued.*

Serial Number.	Departmental Number or Letter.	Name.	Starch.—See Note 1.	Phosphoric acid P_2O_5.	Sulphuric acid SO_3.	Alumina Al_2O_3.	Undetermined.—See Note 2.	Carbonic Acid Gas See Note 3. Available.	Carbonic Acid Gas Residual.	Carbonic Acid Gas Total.	Bi-Carbonate of Soda. See Note 4. Available.	Bi-Carbonate of Soda. Total.	Remarks.	Analyst.
33	20143a	Golden Crown	42·1	5·93	8·41	....	.....	9·3	....	....	17·8	....	Maize starch	Fagan.
34	20143b		50·4	4·97	8·92	2·81	32·9	9·9	2·3	12·2	18·8	23·1		M.
		Means	46·2	5·45	8·67	....	....	9·6	....	....	18·3	....		
35	17185a	Gold Standard	52·5	5·34	9·74	3·47	28·95	9·0	1·4	10·4	17·2	20·0	Maize starch	Kenrick.
36	17185b		....	4·35	8·82	....	....	..	....	....	....	....		M.
37	17192a		55·8	4·55	9·04	3·56	27·05	9·8	1·5	11·3	18·8	21·7		Kenrick.
38	17192b		52·7	...	8·99	...	....	....	....	....	....	....		M.
		Means	52·2	4·75	9·15	3·52	30·38	9·4	1·5	10·9	18·0	20·9		
39	18472a	Jersey Cream	...	...	11·72	4·20	....	4·3	2·5	6·8	8·1	12·9	Maize starch	Ellis.
40	18472b		53·8	6·14	10·54	4·20	25·32	....	..	7·0	...	13·4		M.
		Means	....	....	....	....	....	..	....	6·9	..	13·2		
41	19591a	Lily White	45·7	4·60	15·30	3·32	31·08	6·4	...	..	12·2	...	Maize starch	Fiset.
42	19591b		45·8	4·20	11·50	2·24	36·26	6·4	5·8	12·2	12·2	19·4		M.
		Means	45·7	4·40	13·40	2·78	33·67	6·4	..	...	12·2	....		
43	17679a	Magic	38·7	....	....	..	....	8·1	2·0	10·1	15·4	19·3	Maize starch	Bowman.
44	17679b		45·7	4·35	9·27	....	....	....	..	....	..	....		M.
45	18478a		45·4	4·73	14·32	5·30	30·25	7·4	5·6	13·0	11·8	24·7		Ellis.
46	18478b		38·8	6·59	13·12	4·54	36·95	....	..	....	...	...		M.
47	20146a		....	4·67	9·61	..	....	....	....	7·9	....	15·1		Fagan.
48	20146b		49·4	3·93	9·06	2·77	34·84	7·4	1·2	8·6	14·2	16·4		M.
		Means	43·6	4·86	11·08	4·20	34·01	7·7	2·9	10·6	13·8	18·9		

49	19297*a*	Mayell's Cream....	38·0	4·37	14·28	4·14	39·21	10·1	....	....	19·3	....	Maize starch....	Harrison.
50	19297*b*		35·5	6·32	15·80	4·18	38·20	....	....	....	....	....		M.
		Means....	36·8	5·35	15·04	4·16	38·70	....	....	....	....	....		
51	19572*a*	Newman's....	48·0	....	....	....	....	6·1	....	....	11·6	....	Maize starch....	Edwards.
52	19572*b*		46·9	3·58	13·46	3·99	32·07	7·3	1·1	8·4	14·0	16·1		M.
		Means....	47·5	....	....	....	....	6·7	....	....	12·8	....		
53	18477*a*	Ocean Wave....	53·3	4·41	12·51	5·50	24·28	8·0	3·6	11·6	15·3	22·2	Maize starch....	Ellis.
54	18477*b*		46·4	5·94	10·88	3·92	32·66	11·2	1·6	12·8	21·4	24·4		M.
55	192 9*a*		48·5	3·97	12·61	3·32	31·60	10·1	....	....	19·3	....		Harrison.
56	19299*b*		....	....	....	....	....	....	....	12·8	....	24·4		M.
57	20149*a*		43 1	2·26	15·10	3·20	36·34	....	....	12·0	....	22·9		Fagan.
58	20149*b*		45·4	4·79	12·01	4·01	33·79	8·6	1·2	9·8	14·2	18·7		M.
		Means....	47·3	4·27	12·62	3·99	31·73	9·5	2·1	11·8	18·2	22·6		
59	19595*a*	On Top....	37·7	7·00	15·09	4·08	36·13	6·7	....	....	12·8	....	Maize starch....	Fiset.
60	19595*b*		39·6	6·58	10·70	4·00	39·12	6·1	....	11·1	11·7	21·2		M.
		Means....	38·7	6·79	12·90	4·04	37·63	6·4	....	....	12·2	..		
61	18462*a*	Paradise....	43·5	....	10·24	....	....	7·2	3·1	10·3	13·8	19·6	Maize and rice starch. Another sample contained 49·4 p.c. starch.	Valade.
62	18462*b*		46·4	5·40	9·24	3·02	35·94	11·6	0·9	12·5	22·1	23·8		M.
		Means....	45·0	....	9·74	....	....	9·4	2·0	11·4	17·5	21·7		
63	19589*a*	Pearce....	42·6	5·16	14·61	4·16	33·47	8·2	....	....	15·7	....	Maize starch....	Fiset.
64	19589*b*		45·4	5.02	12·25	3·54	33·79	8·1	1·7	9·8	15·6	18·7		M.
		Means....	44·0	5·09	13·43	3·85	33·63	8·2	....	....	15 7	....		
65	20147*a*	Purity....	46·9	6·60	12·36	....	....	....	....	10·1	....	19·3	Maize starch....	Fagan.
66	20147*b*		50·0	5·31	9·48	3·34	31·87	9·4	0·5	9·9	17·8	18·8		M.
		Means....	48·5	5·96	10·92	....	....	..	....	10·0	....	19·1		
67	M	Regal....	61·7	1·82	6·42	2·27	27·39	11·8	1·6	13·4	22·5	25·6	Maize starch. Is essentially an alum p'wdr.	M.
68	17187*a*	Smith's Cream....	51·3	4·88	11·16	3·20	29·46	10·3	1·7	12·0	19·6	22·8	Maize starch....	Kenrick.
69	17187*b*		47·0	5·75	9·76	2·77	34·72	....	....	....	....	....		M.
		Means....	49·2	5·32	10·46	2·99	32·09	....	....	....	....	....		

TABLE IV.—ALUM PHOSPHATE BAKING POWDERS—*Concluded.*

Serial Number.	Departmental Number or Letter.	Name.	Starch.—See Note 1.	Phosphoric acid P_2O_5.	Sulphuric acid SO_3.	Alumina Al_2O_3.	Undetermined.—See Note 2.	Carbonic Acid Gas. See Note 3. Available.	Carbonic Acid Gas. Residual.	Carbonic Acid Gas. Total.	Bi-Carbonate of Soda. See Note 4. Available.	Bi-Carbonate of Soda. Total.	Remarks.	Analyst.
70	19574*a*	Vienna	35·1	....	....	.....	....	2·9	.....	..	5·4	...	Maize starch. Contains tartaric acid equivalent to 12·1 p.c. cream tartar.	Edwards.
71	19574*b*		28·3	5·28	15·28	4·32	46·82	5·1	0·5	5 6	9·7	10·7		M.
		Means	31·7	.....	....	....	....	4·0	......	.....	7·7	......		
72	17183*a*	West End	51 2	5 06	9·59	3·38	30·77	10·1	1·4	11·5	19·2	21·9	Maize starch	Kenrick.
73	17183*b*		49 6	4·99	7·80	2·56	35·05	......	.....	...	......	.....		M.
		Means	50 4	5·03	8·70	2·97	32·91	...	.....	...	.....	.....		
74	17186*a*	White Star	51·2	5·07	9·81	3·20	30·72	9·2	2·2	11·4	17·6	21·9	Maize starch	Kenrick.
75	17186*b*		47·0	5·81	9·82	2·81	34·56	.	......	....	...	....		M.
76	17191*a*		50.4	4·98	9·82	3·37	31·43	9·8	1·4	11·2	18·8	21·5		Kenrick.
77	17191*b*		48·5	4·39	9·23	2·58	35·30	..	...	......	..	...		M.
78	20156*a*			4·67	8·92	....	....	.....	....	7·1	.....	13 5		Fagan.
79	20156*b*		47·2	6·19	9·68	2·83	34·10	7·1	1·7	8·8	13·5	16·8		M.
		Means	49·0	5·20	9·55	2·96	33·37	8·7	1·8	10·5	16·6	20·1		
80	18461*a*	Windsor	45·6	2·97	10·49	....	....	5·8	1 4	7·3	11·2	13·9	Maize and rice starches. CaO = 5·28 p. c.	Valade.
81	18461*b*		41·9	1·81	10·40	2·54	40·35	.....	.....	....	.....	.....		M.
82	19590*a*		43·8	5·04	13·92	3·56	33·68	10·5	.....	....	20 1	. .		Fiset.
83	19590*b*		43·9	.....	......	. .	... ...	10·3	.....	......	19·6	....		M.
		Means	43·8	4·27	11·60	3·05	37 28	8·9	......	..	17·0	....		

Notes to Table IV.

1. For method used in starch estimation *see* Note 1 to Table III.
2. This number includes bi-carbonate of soda ; alkalies present as sulphates, with the alum ; lime and moisture.
3. For method of estimating gas, *see* Notes 2 and 3 to Table II.
4. The bi-carbonate of soda stated in this column is that present as such in the powder at the time of analysis. It may fall much below the amount normally present in the sample, since that converted into sulphate, phosphate, &c., through spontaneous deterioration, is excluded.

TABLE V.—A Study of Substances used as Acid Components of Baking Powder.

No.	Nature of Acid Component.	History.	Acidity per 100 grammes stated in cc. normal. Theory.	Experiment. (Phenolphthalein)	100 parts by weight of the acid component react with given parts bi-carbonate of soda.	Percentage composition of a mixture of maximum gas producing power. Acid component.	Bi-carbonate of soda.	Gas produced by 100 parts of such mixture.	Composition of a mixture reduced by starch to yield 13 per cent of gas. Acid component.	Bi-carbonate of soda.	Starch.	Remarks.
1	Bi-tartrate of potash	Bull. 12, p. 16	532	532	44·7	69	31	16·2	55·4	24·9	19·7	
2	Free tartaric acid		1,333	1,333	112·0	47	53	27·8	21·9	24·9	53·2	
	Ammonium alum—											
3	Crystallized	Bull. 26, p. 15	661	648	54·4	64·7	35·3	18·5	45·4	24·9	29·7	
4	"Burnt" to loss 38 1 p.c	"		990	83·2	54·5	45·5	23·8	29·7	24·9	45·4	
5	" 62·5 p.c	"		1,556	130·7	43·4	56·6	29·6	19·0	24·9	56·1	
6	Overburnt	"		1,160	97·4	50·7	49·3	25·8	25·1	24·9	50·0	
	Potash alum—											
7	Crystallized		632		54·4	65·0	35·0	18·5	45·4	24·9	29·7	$SO_3=35·7$ p.c.
8	"Burnt" to loss of 38·5 p.c	Experiment		1,368	114·9	46·5	53 5	28·0	21·5	24·9	53·6	$SO_3=57·9$ p.c.
9	" 36·4 p.c	"		1,368	114·9	46·5	53·5	28·0	21·5	24·9	53·6	$SO_3=56·7$ p.c.
10	" 49·5 p.c	"		1,544	129·7	43·6	56·4	29·5	19·1	24·9	56·0	$SO_3=66·6$ p.c.
	"Burnt alum" of commerce—											
11	Sample No. 1	Bull. 26, p. 17.		1,176	99 0	50 2	49·8	26·0	25·1	24·9	50·0	
12	" 2	Customs Dept		1,428	120·0	45·5	54·5	28·5	20·7	24·9	54·4	$SO_3=63·9$ p.c.
13	" 3	"		1,254	105·3	48·7	51·3	26·9	23·4	24·9	51·7	$SO_3=63·2$ p.c.
14	" 4	"		1,478	124·2	44·6	55·4	29·0	19·9	24·9	55·2	$SO_3=62·9$ p.c.
	Sulphate of alumina—											
15	Dry		1,754		147·3	40·5	59·5	31·2	16·8	24·9	58·3	
16	Crystallized			904	75·9	57·1	42·9	22·5	32·9	24·9	42 2	
17	Burnt to loss of 25·6 p.c			1,208	101·5	49·6	50·4	26·4	24·2	24·9	50·9	
18	" 42·4 p.c			1,552	130·4	43·4	56.6	29·6	19·0	24·9	56·1	
19	" 45·6 p.c			1,616	135·7	42·4	57·6	30·1	18·3	24·9	56·8	
	Acidphosphate of lime—											
20	"Straight" phosphate	Bull. 26, p. 19		690	58·0	63·3	36·7	19·2	42·8	24·9	32·3	$P_2O_5=23·25$ p.c. $SO_3=29·70$ p.c.
21	" "	Another sample		542	45·5	68·7	31·3	16·4	54·4	24·9	20·7	
22	"Leeched" "	Bull. 26, p. 19		495	41·6	70·6	29·4	15·4	59·5	24·9	15·6	Contained 52·0 p.c. starch.
23	" "	Another sample		586	49·2	67·0	33·0	17 3	50·2	24·9	24·9	
24	Rumford Ch. works—1	Furnished through a friend		618	51·9	65·8	34·2	17·9	47·8	24·9	27·3	$P_2O_5=30·25$ p.c., $SO_3=12·5$ p.c. starch=14·9 p.c.
25	" 2	" "		610	51·2	66·1	33·9	17·7	48·6	24 9	26·5	$P_2O_5=26·68$ p.c., $SO_3=20·2$ p.c. starch=5·76.
	Bi-sulphate of potash—											
26	Dry		735		61·7	61·8	38·2	20·0	40·1	24·9	35·0	
27	Burnt alum	Customs Dept		1,320	110·9	47·4	52·6	27·5	22 4	24·9	52·7	An ammonia alum.

APPENDIX L.

BULLETIN No. 69.—CONDENSED MILK, 1900.

JUNE 15, 1900.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—The accompanying tables give the results of analysis of 70 samples of condensed milks, representing 12 different brands. These samples were collected in December of last year, and the results tabulated are accredited to the various district analysts by whom the analyses were made.

Where two lines of figures are found after any sample, the lower line shows the results of analysis of a duplicate sample taken from the same tin and made in this laboratory.

The last bulletin (No. 54) issued by this department on the subject of condensed milk had regard to collections made in November, 1897. No special instructions were furnished to the analysts as to the methods to be employed in analysis, and both the district analysts and those at the central laboratory used the generally accredited methods as found described in the manuals. (See Commercial Organic Analysis, by A. H. Allen, vol. IV, p. 229. Principles and Practice of Agricultural Analysis by H. W. Wiley, vol. III, p. 485, and Dairy Chemistry, by H. D. Richmond, p. 116.)

These methods possess in common the feature of reducing the sample to the limpidity of normal milk by addition of a proper amount of water, and the subsequent treatment of the diluted article as in the case of normal milk. Where the milk has been condensed without addition of sugar this process works quite well; but the presence of any considerable percentage of cane sugar interferes with the extraction of the fat, and hence yields results which recent work shows to be from about 1 to as much as 2·5 per cent below the truth. This difficulty was pointed out by Mr. Otto Hehner some twenty years ago (The Analyst, 1879, vol. IV, p. 45), but his observation has not found its way into the recognized works on condensed milk analysis, and was overlooked by me in 1897. Mr. Hehner's suggestions for overcoming the difficulty, caused by the presence of a large proportion of sugar, have been examined in this laboratory during the last year (see Appendix) but have not been found altogether satisfactory. The best results have been obtained by alternate extraction with petroleum ether and water; and it is by this method of working that the results (on fat) have been obtained as set forth in the accompanying tables.

Mr. Macfarlane, Chief Analyst of this department, has done a large amount of investigation work, in this connection. In part of this work he has collaborated with Dr. J. Geisler, of New York (on behalf of the New York Condensed Milk Company), and to this company, together with the Canadian condensed milk companies at Antigonish, Truro, Baldwin's Mills and Winnipeg, the thanks of this laboratory are due, for their having kindly facilitated the examination of methods by supplying samples of their products whose history could be vouched for.

The details of the investigation work referred to are given in an appendix, and I have added a table which gives, in synoptic form, a comparison of the results for fat obtained by the methods adopted in 1897 with those obtained by the improved methods now in use. It will be seen that the methods which ignore the presence and retarding influence of cane sugar, yield too low a percentage of fat by about 1 to 2½ units; and this error has caused the analyst, in several cases, to ascribe to the skimming of the milk, a lack of butter fat which was only apparent, and due entirely to faulty methods of analysis. This has been done in Bulletin 54, in the cases of the following brands, viz. :—Eagle, Milkmaid, Nestles and Reindeer. Samples of these brands on analysis by the improved methods, yield respectively, 2·45, 1·36, 1·58 and 2·05 per cent of fat more than they yielded to the older methods; and are thus placed beyond all suspicion of having been made from other than whole milk.

Mr. Macfarlane's experimental work (which forms the appendix to this bulletin) is of the highest importance, and will, doubtless, become classic upon the subject with which it deals. It has fallen to me to put it into shape for the printer (owing to Mr. Macfarlane's absence in Europe), and I beg to recommend the whole for publication together, with the accompanying letter from Dr. Ellis, which bears upon this subject.

I have the honour to be, sir,

Your obedient servant,

A. McGILL,

Acting Chief Analyst.

February 3, 1900

THOMAS MACFARLANE, Esq,. F.R.S.C.,
Chief Analyst, Inland Revenue Department,
Ottawa.

DEAR SIR,—In forming an opinion of the genuineness or otherwise of the samples of milk reported in the inclosed certificates, I was guided by the following considerations:—

The solids not fat in the original milk are made up of albuminoids, lactose and ash. In the condensed milk these are increased by cane sugar added. A portion of this cane sugar is liable to undergo inversion in which case it will be reckoned lactose in the analysis and will go to increase the quantity of the solids not fat.

If the fat in the original milk is reckoned from the proportion which it bears to the solids not fat any inversion of cane sugar, or any other increase in the apparent percentage of solids not fat, will lower the fat in the original milk as shown by calculation.

The quantity of albuminoids reduced from the nitrogen determined by Kjeldahl's process, is a value which can be got with more accuracy than either the lactose or the cane sugar, and is one of the most constant constituents of milk.

I have therefore calculated the fat in the original milk by the following formula: $\mathfrak{F}' = \frac{3{\cdot}6 f}{c}$ where $f =$ fat found per cent in condensed milk; $\mathfrak{F}' =$ fat per cent in original milk; $c =$ albuminoids per cent in condensed milk; 3·6 = albuminoids per cent in normal milk (3·55 = mean of 793 analyses Koenig, p. 295.)

The results by this formula are as follows :—

20621 Owl $\mathfrak{F}' =$	4·3
20922 Export	3·9
20623 Reindeer	3·7
20624 Jubilee	3·5
20625 Eagle	3·5
20645 Nestlé	3·46
20646 Milkmaid	3·3
20647 Export	4·5
20648 Eagle	3·5
20649 Owl	3·7

I have reported in accordance with these results.

Yours truly,

W. H. ELLIS.

RESULTS of the Examination of 70

No. of Sample.	Date of Collection.	Brand.	Factory No.	Quantity purchased.	Price.	Name and Address of Vendor.	Name and Address of Manufacturer.
	1899.				Cts.		
20601	Dec. ..	'Owl'........	......	.....	....	Duplicate sample obtained from factory.	Canada Milk Condensing Co., Antigonish, N.S.
20602	" ..	'Export'.....	801	......	....	" " .	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20603	" ..	'Reindeer'....	495	.....	....	" " ..	Truro Condensed Milk and Canning Co., Truro, N.S.
20604	" ..	'Jubilee'.....	323	...	....	" " ..	The Manitoba Dairy Co., Winnipeg, Man.
20605	" ..	'Eagle'	60421	.....	....	" " ..	New York Condensed Milk Co ..
						Halifax, N.S.	
16754	" 8	'Owl'.......	..	1 tin..	15	W. E. Crowe, Gottingen St.	Canada Milk Condensing Co., Antigonish, N.S.
16755	" 8	'Mayflower'..	....	" .	15	A. M. Boutilier & Co., Gottingen St.	Truro Condensed Milk Co., Truro, N.S.
16756	" 8	'Milkmaid'..	..	" .	20	" " ..	Anglo-Swiss Condensed Milk Co., Cham, Switzerland.
16757	" 9	'Reindeer'..	.....	" .	20	E. W. Crease, Argyle St.	Truro Condensed Milk and Canning Co., Truro, N.S.
16758	" 9	'Owl'........	.....	" .	15	W. C. Anderson, Granville St.	Canada Milk Condensing Co., Antigonish, N.S.
20606	" ..	'Owl'	....	......	....	Duplicate sample obtained from factory.	" " ..
20607	" ..	'Export'. ...	801	......	..	" " ..	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20608	" .	'Reindeer'....	495	......	....	" " ..	Truro Condensed Milk and Canning Co., Truro, N.S.
20609	" ..	'Jubilee'. ..	323	...	..	" " ..	The Manitoba Dairy Co., Winnipeg, Man.
20610	" ..	'Eagle'...	60421	...	...	" " ..	New York Condensed Milk Co ..
						Quebec.	
19655	" 27	'Reindeer'...	...	1 tin..	20	E. Clarke, Bridge St..	Truro Condensed Milk and Canning Co., Truro, N.S.
19656	" 27	'Owl'........	....	" .	20	G. Turcotte, 122 St. John St.	Canada Milk Condensing Co., Antigonish, N.S.
19657	" 27	'Nestle's' ..	....	" .	25	P. F. Rinfret, 156 St. John St.	Henri Nestle, Switzerland .....
19658	" 27	'Export'....		" .	20	J. Savard, 35 St. John St.	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
19659	" 27	'Milkmaid'..		" .	25	J. E. Dubé, St. John St.	Anglo-Swiss Condensed Milk Co., Cham, Switzerland.
19660	" 28	'Viking'....		" .	20	A. Grenier, 94 St. John St.	Norwegian Milk Condensing Co..
20611	Dec. ..	'Owl'	..	....	....	Duplicate sample obtained from factory.	Canada Milk Condensing Co., Antigonish, N.S.
20612	" ..	'Export'.....	801	...	...	" " ..	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20613	" ..	'Reindeer'....	495	.....	....	" " ..	Truro Condensed Milk and Canning Co., Truro, N.S.
20614	" ..	'Jubilee'.....	323	.....	..	" " ..	The Manitoba Dairy Co., Winnipeg, Man.
20615	" .	'Eagle'... ..	60421	.....	....	" " ..	New York Condensed Milk Co ..

Samples of Condensed Milk.

Results of Analysis.												
Water.	Butter Fat.	Reducing Sugar as Lactose.	Albumenoids by Kjeldahl.	Ash.	Cane Sugar.	Specific Gravity of 20 p.c. Solution.	Original Gravity.	Concentration.	Total Solids.	Name of Analyst.	Official Analyst's Remarks.	No. of Sample.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.				p. c.			
30·05	9·77	10·79	8·06	1·87	39·46	1·0440	1·282	2·872	69·95	M. Bowman, Halifax, N.S.	Genuine........	20601
26·52	10·07	13·32	7·88	1·98	40·23	1·0465	1·303	3·265	73·48	″ ..	″	20602
26·92	9·12	12·73	7·50	1·87	41·06	1·0469	1·306	3·120	73·08	″ ..	″	20603
32·37	8·35	13·06	7·38	1·79	37·05	1·0437	1·279	3·074	67·63	″ ..	″	20604
29·82	8·04	12·02	7·50	1·80	40·82	1·0456	1·295	2·984	70·18	″ ..	″	20605
30·71	8·59	15·31	7·50	1·92	35·97	·0451	1·293	3·460	69·29	″ ..	″	16754
30·55	7·80	16·69	7·87	2·00	35·09							
28·94	9·31	11·55	7·50	1·95	40·75	1·0461	1·299	2·949	71·06	″ ..	″	16755
29·90	8·40	14·91	8·31	2·00	36·48							
27·03	9·82	14·76	8·94	2·12	37·33	1·0461	1·299	3·625	72·97	″ ..	″	16756
28·10	9·00	19·70	9·81	2·10	31·29							
27·47	9·55	14·79	8·26	1·89	38·04	1·0465	1·303	3·513	72·53	″ ..	″	16757
27·80	8·60	17·10	8·37	2·00	36·13							
29·82	8·28	24·58	7·19	1·99	28·14	1·0465	1·303	4·755	70·18	″ ..	″	16758
29·75	7·65	21·21	7·95	1·80	31·64							
29·27	9·85	12·52	8·63	1·67	38·06	1·0451	1·2912	3·36	70·73	Dr. M. Fiset, Quebec.	....	20606
26·17	9·95	12·83	8·63	1·77	40·65	1·0470	1·3072	3·47	73·83	″ ..	Genuine......	20607
26·57	9·00	13·27	7·80	1·80	41·56	1·0472	1·3088	3·42	73·43	″ ..	″	20608
31·60	8·30	13·41	8·44	1·55	36·70	1·0441	1·2829	3·43	68·40	″ ..	″	20609
28·57	8·05	12·32	7·38	1·65	42·03	1·0466	1·3038	3·18	71·43	″ ..	″	20610
31·50	9·20	16·43	7·69	1·79	33·39	1·0446	1·2870	3·80	68·50	″ ..	″	19655
30·65	9·20	18·47	8·37	1·90	31·41							
30·20	8·15	13·32	8·13	1·70	38·50	1·0459	1·2979	3·44	69·80	″ ..	″	19656
30·90	8·50	12·93	8·68	2·10	36·89							
26·80	9·15	15·00	8·63	1·69	38·73	1·0474	1·3106	3·78	73·20	″ ..	″	19657
27·50	9·60	14·64	9·25	1·90	37·11							
27·07	10·15	12·72	8·69	1·59	39·78	1·0467	1·3046	3·42	72·93	″ ..	″	19658
26·90	10·30	14·93	9·18	1·90	38·79							
25·25	9·35	14·43	8·75	2·06	40·16	1·0491	1·3253	3·82	74·75	″ .	″	19659
24·55	9·20	14·64	9·18	2·10	40·33							
66·23	9·05	12·38	8·80	1·89	None.	1·0175	1·0959	2·89	33·77	″ ..	″	19660
28·84	10·14	10·01	8·23	1·99	40·79	1·0432	1·275	2·43	71·16	Dr. J. B. Edwards, Montreal	″	20611
26·23	9·92	11·18	8·09	2·04	42·54	1·0455	1·294	2·49	73·77	″ ..	″	20612
25·71	9·45	11·14	7·88	1·98	43·84	1·0466	1·303	2·43	74·29	″ ..	″	20613
31·93	8·50	10·70	7·39	1·86	39·62	1·0437	1·279	2·27	68·07	″ ..	″	20614
28·90	8·37	10·31	6·15	1·84	44·07	1·0457	1·296	2·16	71·10	″ ..	″	20615

RESULTS of the Examination of 70

No. of Samples.	Date of Collection.	Brand.	Factory No.	Quantity purchased.	Price.	Name and Address of Vendor.	Name and Address of Manufacturer.
	1899.				Cts.	*Montreal.*	
19649	Dec. 14	'Eagle'		1 tin	25	Jules Hirtz, 564½ Craig St.	New York Condensed Milk Co
						St. Hyacinthe.	
19650	" 16	'Nestle's'		"	25	Pagnuelo Bros., Cascade St.	Henri Nestle, Switzerland
19651	" 16	'Reindeer'		"	18	" "	Truro Condensed Milk and Canning Co., Truro, N.S.
						Montreal.	
19652	" 18	'Owl'		"	20	Gravel Frères, 12 St. Lawrence St.	Canada Milk Condensing Co., Antigonish, N.S.
19653	" 18	'Export'		"	20	" "	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
19654	" 18	'Mayflower'		"	15	T. A. Wood & Co., Berthelot St.	Truro Condensed Milk Co., Truro, N.S.
20616	"	'Owl'				Duplicate sample obtained from factory.	Canada Milk Condensing Co., Antigonish, N.S.
20617	"	'Export'	801			" "	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20618	"	'Reindeer'	495			" "	Truro Condensed Milk and Canning Co., Truro, N.S.
20619	"	'Jubilee'	323			" "	The Manitoba Dairy Co., Winnipeg, Man.
20620	"	'Eagle'	60421			" "	New York Condensed Milk Co
						Ottawa.	
20641	" 8	'Nestle's'		1 tin	25	W. H. Roger, Rideau St.	Henri Nestle, Switzerland
20642	" 8	'Highland'		"	25	A. M. Bélanger, Rideau St.	Helvetia Milk Condensing Co., Highland, Ill., U.S.A.
20643	" 8	'Canadian'		"	18	A. E. Cowan, Sparks St.	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20644	" 8	'Reindeer'		"	20	R. McGregor, Sparks St.	Truro Condensed Milk and Canning Co., Truro, N.S.
20621	"	'Owl'				Duplicate sample obtained from factory.	Canada Milk Condensing Co., Antigonish, N.S.
20622	"	'Export'	801			" "	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20623	"	'Reindeer'	495			" "	Truro Condensed Milk and Canning Co., Truro, N.S.
20624	"	'Jubilee'	323			" "	The Manitoba Dairy Co., Winnipeg, Man.
20625	"	'Eagle'	60421			" "	New York Condensed Milk Co.
						Toronto.	
20645	" 24	'Nestle's'		1 tin	25	E. G. Lemaitre, 256 Queen St.	Henri Nestle, Switzerland
20646	" 24	'Milkmaid'		"	15	J. Butcher, 300 Queen St.	Anglo-Swiss Cond[illegible] MilkCo.
20647	" 24	'Export'		"	20	W. Massen, 99 Queen St.	Baldwin's Condensed Milk Co., Baldwin's Mills, P.Q.

Samples of Condensed Milk—*Continued.*

Results of Analysis.										Name of Analyst.	Official Analyst's Remarks.	No. of Sample.
Water.	Butter Fat.	Reducing Sugar as Lactose.	Albumenoids by Kjeldahl.	Ash.	Cane Sugar.	Specific Gravity of 20 p.c. Solution.	Original Gravity.	Concentration.	Total Solids.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.				p. c.			
31·48	7·83	6·34	7·62	1·99	44·74	1·0449	1·289	1·90	68·52	Dr. J. B. Edwards, Montreal	Genuine.. ..	19649
29·20	7·85	15·32	8·15	1·90	37·58							
28·04	8·06	15·23	7·68	1·94	39·05	1·0470	1·307	2·63	71·96	" ..	"	19650
27·95	8·75	18·74	9·12	2·40	33·04							
27·70	8·02	10·42	8·69	1·76	43·41	1·0465	1·302	2·31	72·30	" ..	"	19651
27·30	8·60	16·15	8·75	1·80	37·40							
30·34	7·06	11·82	7·03	1·94	41·81	1·0460	1·298	2·22	69·66	" ..	"	19652
30·15	7·85	15·46	8·37	2·00	36·17							
27·76	11·04	3·82	6·71	2·03	48·64	1·0445	1·286	1·88	72·24	" ..	"	19653
26·40	10·20	13·69	8·31	1·80	39·60							
30·03	8·31	12·67	8·24	1·82	38·93	1·0454	1·293	2·48	69·97	" ..	"	19654
29·55	8·55	19·29	8·56	1·70	33·35							
27·90	9·28	12·26	7·74	1·95	39·74	1·0445	1·286	3·20	72·10	Dr. F. X. Valade, Ottawa.	"	20616
24·67	10·55	14·97	8·12	1·87	39·94	1·0465	1·303	3·49	75·33	" ..	"	20617
25·45	10·57	17·81	8·96	1·79	34·09	1·0472	1·301	4·19	74·55	" ..	"	20618
28·51	8·33	12·58	7·86	1·72	42·03	1·0440	1·282	2·91	71·49	" ..	"	20619
28·03	8·77	12·95	8·32	1·72	39·12	1·045	1·290	3·35	71·97	" ..	"	20620
23·73	9·18	17·93	7·14	2·02	41·76	1·047	1·307	3·57	76·27	" ..	"	20641
26·70	8·80	16·42	9·81	2·16								
68·15	9·04	11·77	8·45	1·79	None.	1·017	1·093	2·69	31·85	" ..	Very sour, yellow, spoiled, adulterated and unwholesome.	20642
26·77	8·62	13·01	7·37	1·74	43·38	1·0455	1·295	2·96	73·23	" .	Genuine........	20643
29·85	8·40	14·09	8·92	2·00	36·74							
27·63	9·74	17·31	7·11	1·74	44·87	1·048	1·316	3·94	82·37	" ..	"	20644
26·75	8·20	15·60	9·37	2·00	38·08							
28·99	9·77	9·08	7·96	1·70	42·50	1·0470	1·3072	2·46	71·01	Dr. W. H. Ellis, Toronto.	"	20621
25·71	9·96	13·75	9·17	1·91	39·50	1·0480	1·3158	3·61	74·29	" .	"	20622
25·62	9·52	13·89	9·13	1·89	38·95	1·0486	1·3210	3·30	74·38	" ..	"	20623
33·13	8·03	13·07	8·15	1·75	37·87	1·0449	1·2882	3·15	68·87	" ..	"	20624
28·15	7·92	11·56	8·14	1·74	42·49	1·0472	1·3106	3·32	71·85	" ..	"	20625
25·72	9·38	19·10	9·82	3·94	34·04	1·0483	1·3184	2·94	74·28	" ..	"	20645
27·05	9·30	16·69	8·81	2·20	35·95							
25·48	8·66	17·24	9·46	2·13	37·03	1.0494	1·3280	2·70	74·52	" ..	Made from milk a little below the average in butter fat.	20646
26·45	8·15	17·92	8·31	2·30	36·87							
25·76	11·05	11·63	8·84	1·96	41·70	1·0470	1·2072	4·42	74·24	..	Genuine........	20647
26·60	10·20	14·78	7·87	1·70	38·85							

RESULTS of the Examination of 70

No. of Sample.	Date of Collection.	Brand.	Factory No.	Quantity purchased.	Price.	Name and Address of Vendor.	Name and Address of Manufacturer.
	1899.				Cts.	*Peterboro.*	
20648	Dec. 23	'Eagle'	......	1 tin..	25	J. D. Tully	New York Condensed Milk Co...
20649	" 23	'Reindeer'	.. ..	"	15	Spot Cash Store	Truro Condensed Milk and Canning Co., Truro, N.S.
20626	" ..	'Owl'	.....	....	...	Duplicate sample obtained from factory.	Canada Milk Condensing Co., Antigonish, N.S.
20627	" .	'Export'	801	....	....	" "	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20628	" ..	'Reindeer'	495	....	....	" "	Truro Condensed Milk and Canning Co., Truro, N.S.
20629	" ..	'Jubilee'	323	....	....	" "	The Manitoba Dairy Co., Winnipeg, Man.
20630	" ..	'Eagle'	60421	....	....	" "	New York Condensed Milk Co..
						London, Ont.	
19324	" 7	'Milkmaid'	.....	1 tin..	25	Cairncross&Lawrence, Dundas St.	Anglo-Swiss Condensed Milk Co.
19325	" 7	'Eagle'	.....	"	30	J. Callard, 390 Richmond St.	New York Condensed Milk Co..
19226	" 7	'Canadian'	......	"	25	W. W. Emerson, 120 Dundas St.	Baldwin Condensed Milk Co., Balwin's Mills, P.Q.
20631	" ..	'Owl'	......	......	....	Duplicate sample obtained from factory.	Canada Milk Condensing Co., Antigonish, N.S.
20632	" ..	'Export'	801	......	....	" "	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
20633	" ..	'Reindeer'	495	......	..	" "	Truro Condensed Milk and Canning Co., Truro, N.S.
20634	" ..	'Eagle'	60421	.....	....	" "	New York Condensed Milk Co..
20640	" ..	'Eagle'	60681	......	....	" "	" "
						Winnipeg, Man.	
17223	" 18	'Reindeer'	....	1 tin..	15	K. McKenzie & Co...	Truro Condensed Milk and Canning Co., Truro, N.S.
17224	" 18	'Mayflower'	......	"	15	" "	" "
17225	" 18	'Export'	.....	"	15	" "	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.
17226	" 19	'Clover'	......	"	10	E. Nicholson	Truro Condensed Milk and Canning Co., Truro, N.S.
17227	" 19	'Mayflower'	.....	"	15	"	" "
....	" 19	'Jubilee'	323	......	...	Duplicate sample obtained from factory.	The Manitoba Dairy Co., Winnipeg, Man.

Samples of Condensed Milk—*Concluded.*

Results of Analysis.										Name of Analyst.	Official Analyst's Remarks.	No. of Sample.
Water.	Butter Fat.	Reducing Sugar as Lactose.	Albumenoids by Kjeldahl.	Ash.	Cane Sugar.	Specific Gravity of 20 p.c. Solution.	Original Gravity.	Concentration.	Total Solids.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.				p. c.			
27·75	7·87	14·91	8·05	1·69	39·72	1·0480	1·3157	2·87	72·25	Dr. W. H. Ellis, Toronto.	Genuine	20648
28·65	7·70	14·23	7·95	1 90	39·57							
30·72	9·00	11·29	8·85	1·97	38·17	1·0446	1 287	3·21	69·28	" . .	"	20649
29·10	7·35	12·93	7·43	1·90	41·29							
28·65	10·15	12·06	8·26	1·91	38·97	1·0447	1·2880	3·09	71·35	F. T. Harrison, London, O.	"	20626
25·70	10·30	14·34	8·73	1·92	39·01	1·0469	1·3064	3·52	74·30	" . .	"	20627
26·10	9·50	13·41	8·16	1·88	40·95	1·0471	1·3046	3·29	73·90	" . .	"	20628
31·35	9·10	13·54	7·83	1·82	36·36	1·0444	1·2855	3·21	68·65	" . .	"	20629
29·00	9·45	12·80	8·03	1·76	38·96	1·0468	1·3055	3·18	71·0	" . .	"	20630
25·65	9·65	15·17	8·78	2·09	38·66	1·0482	1·3175	3·70	74·35	" . .	"	19324
27·35	8·55	16·69	8·81	2·00	36·60							
26·70	8·40	17·35	7·83	1·76	37·96	1·0479	1·3150	3·82	73·30	" . .	"	19325
29·65	8·80	16·42	8·12	1·80	35·21							
28·90	9·00	12·03	8·26	1·95	39·86	1·0459	1·2980	3·11	71·10	" . .	"	19326
31·60	8·75	12·59	8·92	1·80	36·34							
30·84	10·61	12·40	8·47	1·81	37·55	1 278	. . . . . .	. . . . .	69·16	Prof. E. B. Kenrick, Winnipeg, Man.	. . . .	20631
27·58	10·46	12·10	8·87	1·83	40·92	1·301	. . . . . .	. . . . . .	72·42	" . .	. . . .	20632
27·33	9·56	13.42	8·32	1·80	41·44	1·310	. . . . . .	. . . . . .	72·67	" . .	. . . .	20633
30·60	8·92	11·37	8·26	1·82	38·90	1·294	. . . .	. . . . .	69·40	" . .	. . . .	20634
28·78	8·27	12·48	8·42	. . .	41·53	1·310	. . . .	. . . . . .	71·22	" . .	. . . .	20640
28·53	8·92	12·21	8·35	. . . .	42·03	1·305	. . . . . .	. . . . .	71·47	" . .	. . . .	17223
28·75	9·50	11·63	8·37	1·90	39·85							
28·19	9·57	12·04	8·37	1·79	41 61	1·305	. . . .	. . . . . .	71·81	" . .	. . . .	17224
27·60	9·10	16·55	7·37	1·70	37·68							
26·69	11·50	12·35	8·50	1·80	41·07	1·300	. . . . . .	. . . . .	73·31	" . .	. . . .	17225
26·30	10·15	13·69	8·25	1·60	40·91							
27·62	5·55	13·35	8·47	1·85	45·37	1·341	. . . . . .	. . . . .	72·38	" . .	. . . .	17226
28·50	5·30	16·15	8·25	2·00	39·80							
28·51	9·28	15·70	8 02	. . . .	39·04	1·305	. . . . . .	. . . . .	71·49	" . .	. . . .	17227
28·90	8·70	13·69	7·37	1·80	39·54							
32·15	9·62	11·30	8·61	1·85	38·45	1·277	. . . . . .	. . . . . .	67·85	" . .	. . . .	323

A Comparison of the Results of Analysis of Condensed Milk for Butter Fat, by the Methods used in 1897 (*See* Bulletin 54) and those now in use in this laboratory.

Name of Brand.	Manufacturer.	Bulletin No. 54 (1897.)		Present Bulletin.		Remarks.
		Number of Samples.	Mean Fat Found.	Number of Samples.	Mean Fat Found.	
Allworth's	Canadian Condensed Milk Co., Aylmer, Ont.	2	7·21			No samples of this brand were collected this year.
Allworth's Cream	" " "	1	8·24			" " "
Beaver	Truro Condensed Milk and Canning Co., Truro, N.S.	1	1·35			" " "
Buffalo	The LaBorderie Co., LaBorderie, Man.	3	0·81			" "
Canadian	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.	6	7·87	2	8·69	An average increase of 0·82 per cent fat found.
Clover	Truro Condensed Milk and Canning Co., Truro, N.S.			1	5·43	No samples of this brand were collected in 1897.
Duchess	Forest Canning Co., Halifax, N.S.	1	0·51			" " this year.
Eagle	New York Condensed Milk Co.	9	5·92	11	8·37	An average increase of 2·45 per cent of fat found.
"	(Specially collected)			12	9·15	
				23	8·78	Average of total number of samples analyzed.
Export	Baldwin Condensed Milk Co., Baldwin's Mills, P.Q.	6	8·18	11	10·33	An average increase of 2·15 per cent of fat found.
	(Specially collected)			2	10·30	
				13	10·32	Average of total number of samples analyzed.
Highland	Helvetia Condensed Milk Co., Highland, Ill.	6	8·93	1	9·04	An average increase of 0·11 per cent of fat found.
Jersey	Forest Canning Co., Halifax, N.S	9	6·25			No samples of this brand were collected this year.
Jubilee	The Manitoba Dairy Co., Winnipeg, Man.			7	8·60	" " in 1897.
	(Specially collected)			2	8·74	
				9	8·63	Average of total number of samples analyzed.
Mayflower	Truro Condensed Milk Co., Truro, N.S	2	6·86	4	8·94	An average increase of 2·08 per cent of fat found.
Milkmaid	Anglo-Swiss Condensed Milk Co., Cham, Switzerland.	12	7·69	4	9·05	" " 1·36 " "

Nestle's	Henri Nestle, Switzerland	14	7·40	4	8·98	" " 1·58 " "
Owl	Canada Milk Condensing Co., Antigonish	6	7·93	11	9·23	" " 1·30 " "
	(Specially collected)			2	10·20	
				13	9·38	Average of total number of samples analyzed.
Reindeer	Truro Condensed Milk and Canning Co.,	21	7·16	13	9·21	An average increase of 2·05 per cent of fat found.
	(Specially collected)			2	9·53	
				15	9·25	Average of total number of samples analyzed.
Viking	Norwegian Milk Condensing Co	4	9·24	1	9·05	An average decrease of 0·19 per cent of fat found.

APPENDIX L, BULLETIN 69.

THE ESTIMATION OF FAT IN CONDENSED MILKS CONTAINING CANE SUGAR.

The fact that the presence of cane sugar in milk retards the extraction of the fat by solvents (ether, petroleum, &c.,) has long been known; but it has been thought that a longer than usual exposure to the action of the solvent would overcome this difficulty, and the manuals upon the subject of milk analysis either make no special reference to the matter, or merely recommend a somewhat prolonged extraction. Recent investigation, as shown in the sequel, has proven the practical impossibility of obtaining the whole of the fat, without first removing the sugar. This important observation was first brought to the knowledge of this laboratory by Dr. J. Geisler of New York; and much of the work which follows was done in collaboration with this gentleman. It is now known that the difficulty of extracting fat in presence of sugar was pointed out by Mr. Otto Hehner as long ago as 1879 (The Analyst, Vol. IV., p. 45,) and it is much to be regretted that the recognised treatises on milk analysis have omitted to take notice of his important observation. Mr. Hehner sought to solve the difficulty by precipitating casein and fat together and extracting the fat from the coagulum. This method of working has been tested in this laboratory by Mr. Macfarlane, and has been found less satisfactory than the alternate treatment with petroleum ether and water.

The following assays illustrate this point :—

Name of Sample.	Casein and Fat.	Casein.	Fat, by Difference.	Fat, by Weight.	Fat, by Asbestos Method.
Jubilee	18·40 18·35	10·20 10·07	8·20 8·28	8·26 8·52	8·55
Export	20·70 20·76	11·16 11·46	9·54 9·30	9·48 9.16	10·40
Owl	21·00 20·92	10·62 10·62	10·38 10·30	10·26 10·22	10·40
Reindeer	18·74 18·92	9·68 9·76	9·06 9·16	9·04 9·02	9·52

These results show that nothing would be gained by substituting the Hehner in place of the Asbestos process.

In order to demonstrate the effect of differences in the method of working, as applied to the same sample, seven samples (each consisting of three tins) were purchased in March of last year, from certain vendors in Ontario. The samples selected were of the Eagle Brand, made by the New York Condensed Milk Co. One tin of each sample was sent to Dr. J. Geisler of New York, one to Dr. W. H. Ellis of Toronto, and the third was analyzed by Mr. Macfarlane in this laboratory. The results obtained are stated in the following table :—

No. of Sample.	Dr. Ellis.		Dr. Geisler.		I. R. Laboratory.	
	Water.	Fat.	Water.	Fat.	Water.	Fat.
18133	27·30	6.30	26·81	9·68	29·40	9·67
18134	27·25	6·55	25·42	10·10	28·37	9·35
18135	27·25	6·10	26·49	9·82	28·16	9·80
18137	26·54	8·09	25·54	9·69	28·12	9·95
18138	26·79	6·66	26·42	10·17	28·12	8·95
18140	27·11	7·51	26·60	9·79	27·45	9·37
18142	27·85	5·83	27·25	10·37	28·30	8·62
Averages	......	6·72	....	9·94	....	9·39

In comparing these determinations, it must be remembered that they were made on different tins, and that the latter possibly represented products derived from different runnings at widely different times. By means of the factory numbers on the tins, the officers of the New York company were able to ascertain that they had been produced on different dates, from September 2, 1896 to June 4, 1898. At the same time this fact was not sufficient to account for the great difference (3·22 per cent) between the averages of Dr. Ellis and Dr. Geisler's determinations of the fat, nor perhaps for the difference (0·55 per cent) between Dr. Geisler's results and those obtained here. Dr. Ellis' analyses were made by the ordinarily accepted methods, i. e. a 20 per cent or 10 per cent solution of the condensed milk was made, and treated in crysotile fibre in the same manner as when analysing ordinary milk. The process used in the laboratory was as follows:—20 ccm. of a 10 per cent solution of the condensed milk sample were placed in a large sized Macfarlane tube containing 'asbestos fibre,' and dried over night in the water-bath. The tubes were then weighed and steeped over night in cold petroleum ether, and in the morning washed out with the same solvent. After drying, the tubes were again weighed, the loss being regarded as butter fat. They were then lixiviated by passing through each of them 500 ccm. cold distilled water to remove the sugars, and dried and weighed again. Finally they were again treated with cold petroleum ether, and the loss sustained added to the first determination of butter fat. The extra amount thus obtained averaged 1·2 per cent. As before stated, the results obtained in this way are, as a rule, about 0·5 per cent lower than those of Dr. Geisler; but it has to be remarked that the latter were obtained by extracting with ethyl ether, evaporating off the solvent, and weighing the extract, a method which is known to yield too high results. (See, *Commercial Organic Analyses*, by A. H. Allen, Vol. IV., p. 229; *Principles and Practice of Agricultural Analysis*, by W. H. Wiley, Vol. III., p. 485, &c.)

In order to eliminate as far as possible any difference in the determination of the butter fat due to the samples having been taken from different 'runs' or 'batches,' the New York Condensed Milk Co. was requested to furnish to Dr. Geisler and to this laboratory duplicate cans from the same 'runs.' This the company very kindly consent-ed to do, and reported to the department Dr. Geisler's results. The following is a comparison of the percentages of water and butter fat shown by the different analyses :—

	Dr. Geisler.		T. Macfarlane.	
	Water.	Fat.	Water.	Fat.
Eagle No. 60681	28·79	9·18	28·05	8·80
" No. 60421	28·45	9·33	28·65	9·20

From the foregoing figures it will be seen that the percentages of butter fat reported by Dr. Geisler were still the highest. In Mr Macfarlane's analyses the fat was determined by two hot extractions in Stutzer tubes with petroleum ether, and one intermediate lixiviation with cold water. Mr. Macfarlane also made four additional assays, in the same manner, of each sample, using 25 ccm of a 10 per cent solution in each tube. The different losses which they sustained are as follows :—

No. of Sample.	No. of Tube.	Water lost in drying.	Fat by first extraction.	Loss to 1 litre cold water.	Fat by second extraction.	Loss to 400 ccm cold water.	Fat by third extraction.	Total fat.		Total water extract
60681	5	29·36	6·60	54·32	1·80	1.00	0·00	8·40	8·59	55·32
	6	29·20	6·68	54·32	1·72	0.92	0·00	8·60		55·24
	7	28·92	7·20	54·52	1·52	0.88	0·00	8·80		55·40
	8	29·28	7·32	54·48	1·12	0.96	0·12	8·56		55·44
60421	9	30·20	7·40	53·08	1·32	1.04	0·00	8·72	8·83	54·12
	10	29·64	7·02	53·52	2·00	0.84	0·00	9·02		54·36
	11	30·08	7·20	50·84	....	3.04	1·48	8·68		53·88
	12	30·32	7·52	53·20	1·36	0.88	0·00	8·88		54·08

The work here tabulated shows that the fat is completely extracted by two treatments with petroleum ether, with an intermediate treatment by cold water; that a second treatment by cold water removes about 1 per cent of sugar. (?) It also shows that the error inherent in the method is $(0·40 + 0·34) \div 2 = 0·37$ per cent for butter fat, and $(0·20 + 0·48) \div 2 = 0·34$ per cent for the water extractive.

Many tests have been made in this laboratory to compare the percentages of fat obtained by loss with those resulting from the evaporation of the petroleum ether extract and weighing the fat. They have always been found to correspond very closely. In the case of the petroleum ether extracts from the four tubes numbered 9, 10, 11 and 12 in the foregoing statement, which contained 10 grammes of sample No. 60421, they gave, after complete dissipation of the solvent, 0·885 grammes fat. This is equal to 8·85 per cent, while the result obtained in calculating from loss is 8·83 per cent.

In order if possible to reduce the number of extractions and weighings in the method just detailed, another plan was tried in which the tubes were first leached out with water (both cold and warm water were applied) and then with cold petroleum ether. To test the efficacy of this method, both treatments were repeated a second time. The results obtained in this manner, on the same samples, by Miss M. Tyrrell, assistant in this laboratory, are also here placed on record for future reference.

No. of Sample.	P.c. water lost in drying.	P.c loss to 1 Litre Water.	P.c. loss in first extraction with Pet. Ether.	P.c. loss to 500 ccm. Water.	P.c. loss in second extraction with Pet Ether.	Total p.c. Butter Fat.	Total p.c. Water Extract.
60681		Cold.		Cold.			
	28·05	48·85	8·35	6·35	0 25	8·60	54·90
	27·55	40·00	8·05	14·35	0·75	8·80	54·35
		Warm.		Warm.			
	27·70	54·90	8·55	1·05	0·15	8·70	55·95
	28·05	54·60	8 70	1·00	0·10	8·80	55·60
60421		Cold.		Cold.			
	28·65	48·20	8·75	5·60	0·45	9·20	53·80
	28·70	45·65	8·65	8·00	0·50	9·15	53·65
		Warm.		Warm.			
	28·85	53·75	8·70	0·95	0·25	8·95	54·70
	28·95	53·40	8·70	1·00	0·35	9·05	54·40

These figures show that no advantage has been gained in lixiviating with water first, because the ether extraction which followed was incomplete. The lixiviation with both cold and warm water gave perfectly clear solutions, showing no indication of fat on the surface. Such solutions have been frequently tested by shaking them up with petroleum ether, separating, and distilling off the latter, without obtaining more than traces of a substance soluble in ether. The amount of the latter never exceeded 0·05 per cent calculated on the original condensed milk.

It is important to note, as showing the limits of accuracy of this mode of treatment for fat extraction, that the three series of determinations given on this and the preceding pages, and referring to samples 60681 and 60421, yield mean fat percentages whose greatest variation for No. 60681 is 0·21, and for No. 60421 is 0·37, of one per cent. The average error inherent in the process, would therefore seem to be 0·29 per cent from this study. Taking this into consideration along with the statement on page 16, it seems demonstrated that the method of alternate extraction with petroleum ether and water is accurate to within 0·4 per cent fat.

In November, 1899, application was made to the New York Condensed Milk Co., and also to the Canadian Manufacturers at Antigonish, Truro, Baldwin's Mills and Winnipeg, requesting them to furnish this laboratory with ten duplicate tins from one 'run' or 'batch' in their respective factories, in order that one of each sample might be submitted to the various district analysts in the hope of obtaining concordant results from their analysis. These were distributed in December, 1899, along with samples bought in the open market, the same whose analysis appears in this bulletin. These latter consisted of one tin, half of which was sent to the analysts, and the other retained as a duplicate for analysis in this laboratory. The district analysts had been previously informed of the nature of the results obtained here, and of the necessity for removing the sugar contained in the milk before completing the fat extraction. As a rule the analysts adopted the following methods in making the necessary determinations :—

1. Water: drying 20 ccm of a 10 per cent solution in asbestos fibre.
2. Butter fat: extracting the dried milk in the asbestos with petroleum ether, lixiviating with water and extracting again with petroleum ether.
3. Lactose: precipitating casein and fat from a 20 per cent solution with dilute acetic acid, and determining the lactose in the filtrate by Fehling's solution.
4. Albuminoids: by Kjeldahl's method on a 20 per cent solution.
5. Ash: evaporating to dryness 25 ccm of a 20 per cent solution, and incinerating.
6. Cane sugar: by difference.

The methods adopted by Mr. Bowman, Halifax, and Professor Kenrick, Winnipeg, differed somewhat from the foregoing. The results obtained by the different analysts are given in the tables contained in this bulletin. For purposes of comparison, the analysis of the sample tins from the different condensed milk factories are given in the following table :—

Result of analysing duplicate samples from certain 'runs' or batches of condensed milk produced in various factories.

Description of Samples and Names of Analysts.	Water.	Butter fat.	Lactose.	Albumenoids	Ash.	Cane Sugar.
	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
From Antigonish, 'Owl' Brand—						
Mr. Bowman	30·05	9·77	10·79	8·06	1·87	39·46
Dr. Fiset	29·27	9·85	12·52	8·63	1·67	38·06
Dr. Edwards	28·84	10·14	10·01	8·23	1·99	40·79
Dr. Valade	27·90	9·28	12·26	7·74	1·95	39·74
Dr. Ellis	28·99	9·77	9·08	7·96	1·70	42·50
Mr. Harrison	28·65	10·15	12·06	8·26	1·91	38·97
Prof. Kenrick	30·84	10·61	12·40	8·47	1·81	37·55
Mr. Macfarlane	28·75	10·40	11·77	8·92	1·70	38·46
Average	29·16	9·99				
From Baldwin's Mills, 'Export,' No. 801—						
Mr. Bowman	26·52	10·07	13·32	7·88	1·98	40·23
Dr. Fiset	26·17	9·95	12·83	8·63	1·77	40·65
Dr. Edwards	26·23	9·92	11·18	8·09	2·04	42·54
Dr. Valade	24·67	10·55	14·97	8·12	1·87	39·94
Dr. Ellis	25·71	9·96	13·75	9·17	1·91	39·50
Mr. Harrison	25·70	10·30	14·34	8·73	1·92	39·01
Prof. Kenrick	27·58	10·46	12·10	8·87	1·83	40·92
Mr. Macfarlane	26·55	10·40	12·45	8·92	1·75	39·93
Average	26·05	10·20				
From Truro, 'Reindeer,' No. 495						
Mr. Bowman	26·92	9·12	12·73	7·50	1·87	41·06
Dr. Fiset	26·57	9·00	13·27	7·80	1·80	41·56
Dr. Edwards	25·71	9·45	11·14	7·88	1·98	43·84
Dr. Valade	25·45	10·57	17·81	8·96	1·79	34·09
Dr. Ellis	25·62	9·52	13·89	9·13	1·89	38·95
Mr. Harrison	26·10	9·50	13·41	8·16	1·88	40·95
Prof. Kenrick	27·33	9·56	13·42	8·32	1·80	41·44
Mr. Macfarlane	27·10	9·65	12·99	8·75	1·55	39·96
Average	26·34	9·54				
From Winnipeg, 'Jubilee,' No. 323						
Mr. Bowman	32·37	8·35	13·06	7·38	1·79	37·05
Dr. Fiset	31·60	8·30	13·41	8·44	1·55	36·70
Dr. Edwards	31·93	8·50	10·70	7·39	1·86	39·62
Dr. Valade	28·51	8·33	12·58	7·86	1·72	42·03
Dr. Ellis	33·13	8·03	13·07	8·15	1·75	37·87
Mr. Harrison	31·35	9·10	13·54	7·83	1·87	36·36
Prof. Kenrick	32·15	9·62	11·30	8·61	1·85	38·45
Mr. Macfarlane	31·45	8·90	11·77	8·66	2·00	37·22
Average	31·56	8·64				
From New York Co., 'Eagle,' No. 60,421						
Mr. Bowman	29·82	8·04	12·02	7·50	1·80	40·82
Dr. Fiset	28·57	8·05	12·32	7·38	1·65	42·03
Dr. Edwards	28·90	8·37	10·31	7·02	1·84	43·56
Dr. Valade	28·03	8·77	12·95	8·32	1·72	39·12
Dr. Ellis	28·15	7·92	11·56	8·14	1·74	42·40
Mr. Harrison	29·00	9·45	12·80	8·03	1·76	38·96
Prof. Kenrick	30·60	8·92	11·37	8·26	1·82	38·90
Mr. Macfarlane	28·65	9·20	13·41	7·87	1·65	39·22
Average	28·96	8·59				

It has already been shown (see page 17) that the probable error inherent in the method, in the hands of the same analyst, is not greater the 0·4 per cent of fat. The table on the preceding page enables us to judge the probable error involved when the method is employed by different persons, if we assume that the sample tins furnished to the various analysts contained absolutely similar material. We have seen that they were intended to contain similar material, having for this purpose been taken, in each brand, from the same 'run' or 'batch.'

FAT percentages obtained by eight analysts.

Brand.	Mean.	Maximum.	Minimum.	Difference.
Owl	9·99	10·61	9·28	1·33
Export	10·20	10·55	9·92	0·63
Reindeer	9·54	10·57	9·12	1·45
Jubilee	8·64	9·62	8·03	1·59
Eagle	8·59	9·45	7·92	1·53
Mean difference Maximum and Minimum				1·31

It is impossible to believe that an error so great as that indicated could occur were the samples worked upon truly identical in character as these samples were intended to be; and if this conclusion be correct the inference is that, with the best intentions on the part of a manufacturer, uniformity of composition in his product is not possible and a variation of one (1) per cent, may occur on the fat content of one tin, as compared with another, of even the same batch. Of course this conclusion must not be considered as final, and it is only stated as a legitimate inference from the analytical results above tabulated.

As a check upon this I have studied the difference (as given in the accompanying bulletin) between the results obtained by the district analysts and those obtained in this laboratory upon thirty-two (32) samples—in the case of which each sample was taken from the same tin, after as thorough mixing as possible. The mean difference is 0·585 per cent fat. For 10 samples the difference is less than 0·25 per cent; for 4 samples it exceeds 1 per cent.

That the sample even in the contents of one can, is not homogenous has been maintained by Professor Kenrick, who contends, that even with thorough mixing, absolute uniformity is unattainable. Mr. Harrison thinks that the sample can be made uniform only by emptying the whole contents of the can on a large glass plate and mixing thoroughly with a spatula. The practice in this laboratory has been to thoroughly stir the contents of the can before removing the portion for analysis. The following conclusions, I quote in Mr. Macfarlane's own words. 'It seems to me, with this experience in view, that to take the position that the tins from one batch are of the same composition throughout and absolutely identical even as regards their minutest portions, is scarcely warranted. It is well known that the condensed milk, in the process of cooling, is apt to separate into portions of unequal composition, and that to prevent this continuous stirring is resorted to. Whether the latter, or any other means adopted to accomplish the desired end, is always and absolutely to be depended on, and whether no change in homogeneity takes place in the receptacle from which the tins are filled, may well be doubted. I for my part am not convinced that *absolute* uniformity of product is attainable in any condensed milk factory. In the duplicates from one and the same tin, which appear in the table of results forming this Bulletin, some of the percentages found by the district analysts agree very closely with those obtained in this laboratory, but there are others, which exhibit considerable differences; and where this is the case with the butter-fat, it very frequently happens that the lowest result of the two analyses is accompanied by a higher percentage of lactose. In fact, the latter constituent, the milk sugar, seems to be most irregular and difficult of even distribution when a sample is being mixed. Very often an almost invisible crystalline deposit has formed which it is very difficult again to incorporate evenly throughout the viscid mass. In a tin containing condensed milk of this description, the upper part was poured off from the bottom part, in which crystalline particles had developed. These can be identified as milk sugar crystals under the microscope and when a small quantity is dissolved in the mouth, a gritty residue is left. The analysis of the separated portions resulted as follows :—

	Upper Part.	Bottom Part.
Water	28·00	23·65
Butterfat	10·25	8·40
Lactose	9·99	24·02
Albumenoids	8·75	7·68
Ash	1·90	1·80
Cane Sugar	41·11	34·45
	100·00	100·00

'From these figures, therefore, the opinion seems to be amply justified, that the differences found by analysts working on different portions of one sample are partly due to the practical impossibility of obtaining truly uniform portions of it.'

APPENDIX M.

BULLETIN No. 70.—FERTILIZERS, 1900.

OTTAWA, May 21, 1900.

W. J. GERALD, Esq.,
Acting Commissioner of Inland Revenue.

SIR,—As explained in the report on Fertilizers for last year (Bulletin No. 65), a change in the time and manner of making this report was then sanctioned by the Commissioner, in consequence of which I have now the honour to place before you, not only the results of analysing the standard samples of fertilizers which, in accordance with the provisions of the Fertilizers Act, have been supplied to the Department, but also the results of examining certain samples of fertilizers collected as sold in the open market. All particulars regarding the standard samples are given in No. I. of the tables appended to this report, while the 'fertilizers as sold' are described in Table II.

The number of standard samples has decreased since last year, as will be seen from the following statement :—

	Standard Samples.
In 1897 there were analysed	107
1898 " "	124
1899 " "	154
1900 " "	107

Last year a special circular was issued to manufacturers, requesting them to be careful, in furnishing the statements required by law, to specify the nature of the materials which enter into the composition of the fertilizer, and also to see that the precise results of analysis are given. They were also informed that 'should two percentages be stated as regards the contents of any one of the fertilizing constituents, the lowest percentage will always be taken as representing the guarantee of the manufacturer or vendor.' Nevertheless, omissions have been made this year also in many instances to state the nature of the materials, and in furnishing the exact particulars which 'a certificate of analysis' calls for. Possibly in some of these cases the result may be that a lower relative value is attached to them than would have been the case if the manufacturer had seen fit to make the declaration in question. The standard samples are given in Table I. attached to this report, and it will be observed that as a rule two lines of figures are given opposite the description of each sample ; the upper line gives the quantities of fertilizing constituents guaranteed by the manufacturers, and the lower line the results of the analysis in this branch. The fourth column in the table states the materials from which the different fertilizers were manufactured in all cases where the information has been supplied. The column headed 'Relative value per ton of 2,000 pounds,' gives the value of each fertilizer based upon the following prices for the fertilizing constituents:—

	Cents per pound.
Nitrogen in salt of ammonia or nitrates	13
Organic nitrogen in ground bone, fish, blood or tankage	12
Phosphoric acid, soluble in water	6
" soluble in ammonium citrate	$5\frac{1}{2}$
" insoluble in ground bone or tankage	5
" insoluble in Thomas's phosphate powder	$3\frac{1}{2}$
" insoluble in ground rock phosphate	$1\frac{1}{2}$
Potash contained in wood ashes	6
" in high grade potash salts	$5\frac{1}{4}$

Since it is impossible in chemical analysis to distinguish between insoluble phosphoric acid from apatite or rock phosphate and that from bone, the declaration of the manufacturer, as regards the material used, is accepted and the calculation based upon it. This declaration also affects the percentage stated in the column headed 'Phosphoric acid available,' the insoluble phosphoric acid from apatite not being reckoned as 'available.' Neither can the insoluble phosphoric acid, regarding the source of which no declaration has been made, be regarded as available. It may be remarked as regards the relative values that these figures afford no indication of the prices at which the goods ought to be sold, because, among other reasons, no regard has been paid to the cost of manufacturing or mixing.

It has been reported by some of the food inspectors of this branch, whose duty also includes the collection of fertilizer samples, that the meaning of the term 'available phosphoric acid' is not by any means clear to the purchasers of such goods, nor to the farming community generally. Since you may decide to cause this report to be published, it seems necessary to make some explanation here as regards the origin and signification of the term. The word 'available' used in the Fertilizers Act of 1890 was used long before that year for indicating the sum of the 'soluble' and the 'reverted' phosphoric acid found in analysing a fertilizer by the chemists of the various Agriculture Experiment Stations of the United States. The explanation given of these terms in the report of the Connecticut Agricultural Experiment Station for 1884 is as follows:—'Soluble phosphoric acid implies phosphoric acid or phosphates that are freely soluble in water. It is the characteristic ingredient of superphosphates, in which it is produced by acting on insoluble phosphates with oil of vitriol. Once well incorporated with the soil it gradually becomes reverted phosphoric acid. Reverted (reduced or precipitated) phosphoric acid means, strictly, phosphoric acid that was once easily soluble in water, but from chemical change has become insoluble in that liquid. In present usage the term signifies the phosphoric acid (of various phosphates) that is freely taken up by strong solution of ammonium citrate, which is therefore used in analysis to determine its quantity. Reverted phosphoric acid implies phosphates that are readily assimilated by crops.' In the same report, when giving the results of analysis, the 'soluble' and 'citrate soluble' phosphoric acid are added together and tabulated as available. This practice has been continued up to the present time not only in the reports of the Connecticut Station, but also in those of the Agricultural Experiment Stations in Massachusetts, Wisconsin, Kentucky, &c.

Of course it may be said that all the phosphoric acid contained in a fertilizer, including that characterised as 'insoluble' and which is neither dissolved by water nor by citrate of ammonia solution, sooner or later becomes available for plant food, but, generally speaking, a farmer who makes use of a fertilizer does so in order to obtain an immediate result or an improved effect upon the crop coming next after the application, and the word 'available' is intended to express that which may be depended upon for immediate effect, say during the first year.

The manner in which the percentages of the various useful constituents of fertilizers is determined throughout the United States was carefully laid down by the Association of Official Agricultural Chemists in November 1898, and published in Bulletin No. 46, Revised Edition, of the U.S. Department of Agriculture in 1899. Owing to the proximity of the United States, and the large quantities of fertilizers imported from thence into Canada, the terms in use regarding them in the United States have been adopted in Canada, and the methods of analysis given in the above mentioned publication have been recommended by me for use by the district analysts of the Dominion.

It will be observed that in Table I. and in connection with samples 1146 and 1147, these are guaranteed to contain a certain percentage of 'citric soluble' phosphoric acid, an expression which has not heretofore found a place in our bulletins. Its meaning will be discussed when reference comes to be made to the fertilizers described in Table II. Meanwhile it may be remarked that the five standard samples of ground basic slag or Thomas phosphate powder show considerable differences as regards the quantity of available phosphoric acid which they contain, the percentage varying from 2·99 to 8·35.

With reference to the 'fertilizers as sold' described in Table II., in which the date of collection and the names of the vendors and manufacturers are given, it is to be observed that, in the most of cases, opposite the description of each sample there will be found three lines of figures. The first of these shows the contents guaranteed by the manufacturer, the second the percentage of fertilizing ingredients found in the sample submitted to the department by the manufacturer or vendor, and the third line gives the same percentages as contained in the sample collected. In cases where no standard samples have been submitted, and nevertheless, in contravention of the provisions of the Fertilizers Act, the fertilizers have been offered for sale, the first and second lines will of course show no figures.

According to the opinions expressed by the analysts, out of 59 samples collected, five have been found to be adulterated. Among them are three samples of Thomas Phosphate powder, which are challenged on account of their containing less than eight per cent of available phosphoric acid as required by the Act. The part of the Fertilizers Act invoked is section 7, 2, which reads as follows :—

'No fertilizer shall be sold or offered for sale unless it contains at least eight per cent of available phosphoric acid, or four per cent of ammonia or its equivalent in nitrogen or nitric acid ; or, when both phosphoric acid and ammonia are present, at least five per cent of available phosphoric acid and two per cent of ammonia or its equivalent in nitrogen or nitric acid.'

Since ground basic slag or Thomas phosphate powder contains no ammonia, the section just quoted requires that it should contain at least eight per cent of available phosphoric acid. The quantity of the latter found by the analysts in the samples analysed was much lower than eight per cent, and hence their condemnation of the fertilizer in question. To this proceeding, as carried out last year, some of the importers of Thomas phosphate powder, especially Messrs. Wallace & Fraser and Mr. Fred. T. Wedderburn of St. John, N.B., have very strongly objected, and asserted that the method of analysis adopted by this branch for ascertaining the percentage of available phosphoric acid does not give the true agricultural value of this particular fertilizer. These parties desire that the amount of soluble phosphoric acid should be determined according to Wagner's system, in which a two per cent solution of citric acid is substituted for a neutral solution of citrate of ammonia, and they bring forward analyses by Voelcker, Dyer and other eminent authorities in England, France and Germany showing a percentage of *citric* soluble phosphoric acid more than double that of the available phosphoric acid found by the Canadian analysts. I have not been able to comply with the wishes of the importers, or to influence the district analysts in the desired direction, for the following reasons :—

1. It would be inconvenient and possibly unjust to change a system which has been established for twelve years, and which is well understood by the fertilizer manufac-

turers and agriculturists of the Dominion, without at least substituting for it another which has the approval of a body of British Chemists having a reputation equally as high as that of the United States Association of Agricultural Chemists.

2. Such a body is the Society of Public Analysts in London, but it has not yet turned its attention to the matter of adopting uniform methods of analysis. Dr. Augustus Voelcker and Dr. Bernard Dyer are both distinguished members of the Society of Public Analysts, but their high reputation as individual chemists would not justify a change in our system, even in the event of their recommending it.

3. As a matter of fact they make no recommendation on the subject, and in their certificates of analysis of Thomas' phosphate powder, they do not characterise the citric soluble phosphoric acid as 'available.'

4. On the other hand, Dr. Paul Wagner, of Darmstadt, in his work 'Die Bewerthung der Thomasmehle,' maintains that the percentage of phosphoric acid dissolved by his 'new' solution (20 per cent citric acid) corresponds with the results of manure trials, and with the relative effect value (Wirkungswerth) of the Thomas powder. This has not yet, however, been confirmed by any British agricultural association of high standing, and is a study the subject of which lies beyond the limits of the activity of this Branch.

5. To apply a 2 per cent citric acid solution for determining the available phosphoric acid in Thomas' phosphate powder, and not to other fertilizers, would be a course calculated to occasion strong objections on the part of the fertilizer manufacturers of this country and of the United States.

6. The terms at present in use for describing fertilizers are already sufficiently complicated for our farmers, and much confusion would result from attempting to cause them to distinguish between 'citrate soluble' and 'citric soluble' phosphoric acid.

There is no doubt that this new fertilizer has obtained a considerable reputation in Germany and England, and that it is entitled to 'a fair field and no favour' in Canada. It may also be the case that, owing to its basic nature, the percentage of available phosphoric acid may be under-estimated by using in its analysis a neutral solution of citrate of ammonia It would therefore be only reasonable so to amend the Fertilizers' Act as to admit of the sale, inspection and analysis of the article without causing it to be condemned by the analysts as 'adulterated under the Act.' An attempt was made to accomplish this during the present session of parliament, when Mr. Domville, M P. introduced a bill to amend the Act in the supposed interest of importers of basic slag. The bill was referred to the Agricultural Committee of the House of Commons, before whom it was discussed on the 28th and 29th March last. Mr. Domville proposed that the section quoted above should be amended by the addition of the following words :—'And in the case of ground basic slag or Thomas' phosphate powder not less than twelve per cent of total phosphoric acid.' This was objected to because it avoided a determination of the available phosphoric acid, and opened a wide door for the adulteration of the basic slag by ground coprolite and apatite. On the other hand, the Minister of Inland Revenue proposed that the added amendment should run as follows :—'And in the case of ground basic slag or Thomas' phosphate powder, at least five per cent of available phosphoric acid, soluble in a neutral solution of citrate of ammonia.' Against this it was argued that it would throw an unjust implication on the basic slag, and expose it to the imputation of being unable to come up to the standard of other fertilizers. Nevertheless the Minister's amendment was adopted, and the bill reported in agreement therewith, although up to the present time of writing it has not been passed in the House of Commons.

Besides the three samples of ground basic slag or Thomas' phosphate powder which were thus challenged there are also eight samples described as unregistered, no standard samples of the brands they represent having been submitted to the department, and two samples which have been pronounced adulterated by the district analysts on account of deficiencies in their fertilizing constituents. In these cases the provisions of the Adulteration Act should be applied against the offenders.

I have appended to the tables certain 'Memoranda on Manures,' which have been found useful in former bulletins, and to which it is desired to give as wide a circulation as possible. I respectfully recommend the whole for publication.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

TABLE I.—Statement of the Results of Examining 107 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1041	Imported	M. J. Henry, Vancouver, B.C.		'Muriate of Potash'— Guaranteed / Found
1042	"	" "		'Fine Bone'— Guaranteed / Found
1043	The W. A. Freeman Co., Hamilton, Ont.	Manufacturers		'Dominion Flower Fertilizer'— Guaranteed / Found
1044	The Wm. Davies Co., Toronto.	"	Dried blood, bones and tankage.	'Compound Fertilizer'— Guaranteed / Found
1045	Bradley Fertilizer Co., 92 State St., Boston, U.S.	"		'Bradley's X L Superphosphate of Lime'— Guaranteed / Found
1046	" "	"		'Bradley's Eclipse Phosphate'— Guaranteed / Found
1047	" "	"		'Bradley's Potato Fertilizer'— Guaranteed / Found
1048	" "	"		'B. D. Sea Fowl Guano'— Guaranteed / Found
1049	" "	"		'Farmers' New Method Fertilizer'— Guaranteed / Found
1050	" "	"		'Bradley's Fine Ground Bone'— Guaranteed / Found
1051	" "	"		'Bradley's Dissolved Bone, with Potash'— Guaranteed / Found
1052	" "	"		'Bradley's Vermonter for all Crops'— Guaranteed / Found
1053	" "	"		'Bradley's Corn Phosphate'— Guaranteed / Found
1054	" "	"		'Bradley's Niagara Phosphate'— Guaranteed / Found
1055	The Laing Packing and Provision Co., Montreal.	"	From Tankage and bones of hogs.	'Fertilizer' (Tankage)— Guaranteed / Found
1056	The Ingersoll Packing Co., Ingersoll, Ont.	"	" "	'Ingersoll Fertilizer'— Guaranteed / Found
1057	The Thomas Phosphate Co.	J. C. Wallace, manager, Toronto.		'Thomas' Phosphate Powder'— Guaranteed / Found

Samples of Commercial Fertilizers, registered for 1900.

Results of Analysis.										
Nitrogen.		Phosphoric Acid.							Relative Value per Ton of 2,000 lbs.	Number of Sample.
Total, including that of Nitric Acid or Ammonia, if present.	Total Calculated as Ammonia.	Soluble in Water.	Reverted or Citrate, Soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
...	...	...	...	...	...	...	...	...	...	1041
...	...	...	...	...	...	...	52·91	0·36	55 56	
...	...	...	...	...	...	...	...	...	...	1042
3·88	4·71	0·57	8·90	15·16	24·63	24·63	...	5·48	34 94	
...	...	...	...	...	...	...	...	...	...	1043
4·29	5·22	5·31	2·05	6·08	13·44	7·36	4·77	7·46	25 74	
7·82	9·50	0·35	...	11·40	...	...	Traces.	9·43	30 58	1044
7·62	9·25	0·96	6·45	4·93	12·34	7·41	0·97	9·06	32 48	
2·07	2·50	8·00	...	...	10·00	...	1·00	...	...	1045
2·29	2·79	5·95	4·02	3·01	12·98	9·97	2·49	13·20	20 58	
1·03	1·25	5·00	3·00	1·00	9·00	8·00	2·00	...	14 17	1046
1·38	1·68	4·80	4·53	2·05	11·38	9·33	2·68	16·68	17·48	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	...	17 99	1047
2·06	2·50	6·08	4·47	3·01	13·56	10·55	3·57	10·98	21 81	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	...	16 42	1048
1·49	1·80	6·90	2·88	3·20	12·98	9·78	1·85	11·00	17 93	
0·82	1·00	5·00	3·00	2·00	10·00	8·00	2·15	...	15 03	1049
1·32	1·60	5·63	4·03	2·05	11·71	9·66	2·36	16·74	17 45	
2 50	3·00	...	...	...	21 00	...	...	...	...	1050
4·06	4·93	Traces.	6·53	16·50	23·03	23·03	...	4·86	33 42	
0·82	1·00	5·00	3·00	2·00	10·00	8·00	2·15	...	15·03	1051
1·43	1·73	5·60	2·88	1·92	10·40	8·48	2·21	18·20	16·22	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	...	17 99	1052
2·20	2·67	6·08	4·95	2·56	13 59	11·03	3·19	10·85	22·15	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	...	16 42	1053
2·20	2·67	5·92	4·73	2·94	13·59	10·65	2·95	10·55	21 56	
0·82	1·00	5·00	2·00	1·00	8·00	7·00	1·00	...	11 52	1054
1·26	1·53	5·87	2·86	1·70	10·43	8·73	1·76	15·34	15 57	
4·12	5·00	...	...	...	14·71	...	...	5·52	...	1055
5·12	6 22	0·77	7·46	9·56	17·79	17·79	0·42	7·48	31 43	
7·41	9·00	...	5·50	6·80	...	...	...	6·00	30 63	1056
7·84	9·52	1·09	5 63	6·08	12·80	12·80	0·48	10·54	32 90	
...	...	...	...	...	15 00	...	...	...	...	1057
0·22	0·27	0·13	4·74	12·60	17·47	4·87	0·31	0·02	15 06	

TABLE I.—Statement of the Results of Examining 107 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1058	Williams & Clark Fertilizer Co., 92 State St., Boston, Mass.	Manufacturers ..	....	'Americus Corn Phosphate'— Guaranteed .... Found ....
1059	" " ..	"	....	'Americus Potato Manure'— Guaranteed .... Found ....
1060	" " ..	"	....	'Royal Bone Phosphate for all Crops'— Guaranteed .... Found ....
1061	The Quinnipiac Co., 92 State St., Boston	"	....	'Climax Phosphate'— Guaranteed .... Found ....
1062	Hy. F. Tucker Co., State St., Boston.	"	....	'Imperial Bone Superphosphate for all Crops'— Guaranteed .... Found ....
1063	Pacific Guano Co., State St., Boston.	"	....	'Soluble Pacific Guano' Guaranteed .... Found ....
1064	" " ..	"	....	'Potato Special'— Guaranteed .... Found ....
1065	" " .	"	....	'Nobsque Guano'— Guaranteed .... Found ....
1066	" " .	"	....	'Pure Bone Meal'— Guaranteed .... Found ....
1067	W. Faint, Peterboro, Ont.	"	....	'Pure Ground Bone'— Guaranteed .... Found ....
1068	Cumberland Bone Phosphate Co., State St., Boston.	"	....	'Phosphate'— Guaranteed .... Found ....
1069	" " ..	"	....	'Potato Fertilizer'— Guaranteed .... Found ....
1070	" " ..	"	....	'Fine Ground Bone'— Guaranteed .... Found ....
1071	The Cleveland Dryer Co., 92 State St., Boston.	"	....	'Fertilizer for all Crops'— Guaranteed .... Found ....
1072	W. Harris & Co., Danforth Avenue, Toronto.	"	....	'Bone Meal'— Guaranteed .... Found ....
1073	" " ..	"	....	'Brand H'— Guaranteed .... Found ....
1074	The Nichols Chemical Co., Capelton, Que.	"	....	'Capelton Superphosphate'— Guaranteed .... Found ....
1075	" " ..	"	....	'The Royal Canadian'— Guaranteed .... Found ....

Samples of Commercial Fertilizers, registered for 1900.

Results of Analysis.											
Nitrogen.		Phosphoric Acid.									
Total, including that of Nitric Acid or Ammonia, if present.	Total Calculated as Ammonia.	Soluble in Water.	Reverted or Citrate, Soluble	Insoluble.	Total.	Total Available.	Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	......	16 42	1058
2.16	2·62	7·27	2·01	3·26	12·54	9·28	1·85	10·20	19 03	
2·06	2·50	6·50	1·50	1·00	9·00	8·00	3·00	.. ...	17 84	1059
2·13	2·60	6·55	3·32	3·77	13·64	9·91	2·69	10·10	20 57	
1·03	1·25	5·00	3·00	2·00	10·00	8·00	2·00	......	14 47	1060
1·35	1·64	5·83	2·49	2·39	10·62	10·62	2·01	17·45	17 39	
1·03	1·25	7·00	1·00	1·00	9·00	8·00	2·00	. .	14 37	1061
1·45	1·75	5·75	2·30	2·50	10·55	8·05	1·91	17·10	15 66	
1·03	1·25	5·00	3·00	1·00	9·00	8·00	2·00	......	14 17	1062
1·38	1·68	5·59	2·40	2·50	10·49	7·99	2·04	16·97	15 55	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	......	16 42	1063
2·38	2·88	8·15	1·83	2·24	12·22	9 98	1·50	12·05	19 78	
2·06	2·50	6·00	2 00	1·00	9·00	8 00	3·00	......	17 79	1064
2·35	2·85	6·29	3·11	4·03	13·43	9 40	2·74	10·70	20 70	
1·03	1·25	5 00	3·00	1·00	9 00	8·00	2·00	..	14 17	1065
1·46	1·77	5 59	2·48	2·49	10·56	8·07	2·04	16·70	14 83	
2·47	3·00	...	.....	....	20·00	20·00	...	....	.. ..	1066
3·67	4·17	Trace.	1 66	17·91	19·57	19·57	0 00	5·00	28 54	
......	......	......	......	......	......	......	......	......	......	1067
4·28	5·20	0·77	5·31	15·67	21·75	21·75	0·39	5·32	33 11	
2 06	2·50	5 00	3·00	2·00	10·00	8·00	1·50	......	16 42	1068
2·44	2·96	8·15	1·13	1·16	10·44	9·28	1·77	12·56	19 09	
2·06	2·50	5·00	3·00	2 00	10·00	8·00	3·00	......	17 99	1069
2·24	2·72	6·62	2·91	3·10	12·63	9·53	4·52	10·93	22 28	
2·47	3 00	......	......	......	20·00	20.00	.....	...	.....	1070
3·42	4·15	......	7·34	16·76	24·10	24 10	......	5·15	33 04	
1·03	1·25	7·00	1·00	1·00	9·00	8·00	2·00	......	14 37	1071
1·30	1·57	6·16	1 84	2 30	10·30	8·00	2·10	16·85	15 34	
......	......	......	......	......	......	......	......	......	......	1072
4·66	5·66	0·45	8·05	11·65	20·15	20 15	0 50	4·12	32 74	
......	......	......	......	......	......	......	......	......	......	1073
7·14	8·67	0·45	3·52	7·04	11·01	11·01	0·50	5·38	24 19	
......	......	......	......	......	......	8·00	......	......	......	1074
......	......	7·36	3·84	3·00	14·20	11·20	......	13·00	13 95	
......	4 00	......	......	......	......	9·00	5·00	......	......	1075
4·27	5·19	8·96	2·24	1·60	12·80	11·20	6·68	7·62	30 95	

TABLE I.—Statement of the Results of Examining 107 Standard

No. of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
1076	The Nichols Chemical Co., Capelton, Que.	Manufacturers		'The Victor'— Guaranteed. Found
1077	" "	"		'The Reliance'— Guaranteed. Found
1078	" "	"		'No. 1 Brand' Guaranteed. Found
1079	" "	"		'Our Crown Brand'— Guaranteed. Found
1080	The W. A. Freeman Co., Ltd., 57 Ferguson Ave., South Hamilton, Ont.	"		'Freeman's Pure Bone'— Guaranteed. Found
1081	" "	"		'Freeman's Sure Growth Manure'— Guaranteed. Found
1082	" "	"		'Freeman's Potato Manure'— Guaranteed. Found
1083	" "	"		'Freeman's Bone and Potash'— Guaranteed. Found
1084	" "	"		'Freeman's Celery and Early Vegetable Manure'— Guaranteed. Found
1085	" "	"		'Freeman's Grass and Grain Manure' Guaranteed. Found
1086	" "	"		'Freeman's Tankage Manure'— Guaranteed. Found
1087	" "	"		'Freeman's Tobacco Manure'— Guaranteed. Found
1088	The Standard Fertilizer & Chemical Co., Ltd., Smith's Falls, Ont.	"	Made from apatite and bone charcoal.	'Superphosphate of Lime'— Guaranteed. Found
1089	" "	"	Made from nitrate of soda, sulphate of ammonia, potash and magnesia salts, mineral superphosphates, bone char and fine bone meal.	'Special Fertilizer' Guaranteed. Found
1090	" "	"		'No. 1 Fertilizer'— Guaranteed. Found
1091	" "	"		'Standard Fertilizer'— Guaranteed. Found
1092	" "	"		'Corn and Grass Fertilizer'— Guaranteed. Found
1093	" "	"		'Royal Fertilizer'— Guaranteed. Found

Samples of Commercial Fertilizers registered for 1900—*Continued.*

Results of Analysis.									Relative value per ton of 2,000 lbs.	No. of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.		
Total, including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
....	2·00	....	....	....	....	7·00	3·00	....	....	1076
2·83	3·43	6·23	3·37	2 24	11·84	9·60	3·94	11·27	22 78	
....	2·00	....	....	....	....	6·00	2·00	....	....	1077
2·67	3·25	4·63	4·33	4·48	13·44	8·96	2·70	9·35	20 91	
....	....	....	....	....	....	11·50	....	....	....	1078
....	....	10·70	3·82	2·24	16·76	14·52	....	11·76	17 71	
....	2·00	....	....	....	....	11·00	2·50	....	....	1079
2·77	3·37	9·75	3·05	1·60	14·40	12·80	3·63	10·34	26 00	
....	3·00	....	....	....	23·00	23·00	....	....	....	1080
2·90	3·52	....	7·84	16·88	24·72	24·72	....	5·27	32 46	
....	3·50	....	....	....	8·00	....	3·00	....	....	1081
4·52	5·48	6·05	1·87	3·20	11·12	7·92	3·98	4·84	25 31	
....	3·00	....	....	....	8·00	....	5·00	....	....	1082
3·96	4·81	5·44	2·51	2·18	10·13	7·95	6·14	4·51	25 89	
....	2·00	....	....	....	9·00	....	6·00	....	....	1083
4·14	5·03	5·24	2·13	2·22	9·59	7·37	8·66	3·43	28 43	
....	6·00	....	....	....	9·00	....	6·00	....	....	1084
6·28	7·63	5·10	1·82	2·50	9·42	6·92	8·17	4·55	32 52	
....	2·00	....	....	....	9·00	....	1·00	....	....	1085
3·61	4·38	4·52	1·53	2·52	8·57	6·05	3·26	4·10	19 94	
....	5·00	....	....	....	12·00	....	....	....	....	1086
6·92	8·40	....	6·38	5·67	12·05	12·05	....	9·41	29 30	
....	6·00	....	....	....	7·00	....	7·00	....	....	1087
6·41	7·78	4·57	2·04	2·12	8·73	6·61	7·53	4·76	31 65	
....	....	....	....	....	14·00	12·00	....	....	....	1088
....	....	6·80	1·10	14·50	22 40	7·90	....	9·90	13 72	
....	3·50	....	....	....	10·00	8·00	6·00	....	....	1089
2·80	3·40	5·00	0·91	9·06	14·97	5·91	8·07	9·30	24 99	
....	1·50	....	....	....	12·00	9·00	1·00	....	....	1090
1·24	1·50	5·75	1·03	12·54	19·32	6·78	1·48	12·00	16 42	
....	2·50	....	....	....	11·00	9·00	2·00	....	....	1091
2·59	3·15	5·75	0·77	12·28	18·80	6·52	2·58	10·90	20 34	
....	2·00	....	....	....	9·00	7·00	4·00	....	....	1092
2·35	2·85	5·90	1·13	11·26	18·29	7·03	3·80	11·00	21 33	
....	2·00	....	....	....	....	8·00	3·00	....	....	1093
1·91	2·31	6·07	....	12·73	18·80	6·07	3·55	10·50	19 41	

TABLE I.—Statement of the Results of Examining 107 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1094	The Standard Fertilizer & Chemical Co., Ltd., Smith's Falls, Ont.	Manufacturers	....	'Bone Meal'— Guaranteed........ Found........
1095	" "	"	....	'Nitrate of Soda'— Guaranteed........ Found........
1096	Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	"	....	'Bowker's Ground Bone'— Guaranteed........ Found........
1097	" "	"	....	'Bowker's Potash Bone Fertilizer'— Guaranteed........ Found........
1098	" "	"	Made from bone, bone black, phosphatic guano, bone phosphates, dried blood, meat or fish, sulphate of ammonia or nitrate of soda, sulphate of potash or muriate of potash and sulphuric acid.	'Bowkers' Vermont Fertilizer'— Guaranteed........ Found........
1099	" "	"		'Bowkers' Square Brand Bone and Potash Fertilizer'— Guaranteed........ Found........
1100	" "	"		'Bowkers' Farm and Garden Fertilizer'— Guaranteed........ Found........
1101	" "	"		'Bowkers' Potash and Vegetable Fertilizer'— Guaranteed........ Found........
1102	" "	"		'Stockbridge Potato and Vegetable Fertilizer'— Guaranteed........ Found........
1103	Lowell Fertilizer Co., 44 North Market St., Boston, Mass.	"	Animal matter, high grade super-phosphate, muriate of potash, and high grade sulphate of potash	'Swifts' Lowell Bone Fertilizer'— Guaranteed........ Found........
1104	" "	"		'Swifts' Lowell Animal Fertilizer'— Guaranteed........ Found........
1105	" "	"		'Swifts' Lowell Potato Phosphate'— Guaranteed........ Found........
1106	" "	"		'Swifts' Lowell Potato Manure'— Guaranteed........ Found........
1107	" "	"	....	'Swifts' Lowell Ground Bone'— Guaranteed........ Found........
1108	Provincial Chemical Fertilizer Company, St. John, N.B.	"	....	'Imperial Superphosphate'— Guaranteed........ Found........
1109	" "	"	....	'Potato Phosphate'— Guaranteed........ Found........
1110	" "	"	....	'Victor Guano' Guaranteed........ Found........
1111	" "	"	....	'Fruit Tree Fertilizer'— Guaranteed........ Found........

Samples of Commercial Fertilizers, registered for 1900.

Results of Analysis.										
Nitrogen.		Phosphoric Acid.								
Total, including that of Nitric Acid or Ammonia, if present.	Total Calculated as Ammonia.	Soluble in Water.	Reverted or Citrate, Soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
....	5·00	....	.....	....	....	20·00	....	....	....	1094
4·12	5·00	....	6·14	17·78	23·92	23·92	....	6·00	34 42	
....	19·00	......	....	....	....	....	....	....	....	1095
15·80	19·20	....	....	......	....	......	....	....	41 08	
....	3·00	....	....	....	24·00	24·00	....	......	....	1096
2·84	3·45	0·77	4·16	19·19	24·12	24·12	0·62	4·14	32 16	
....	2·00	5·00	.....	....	7·00	5·00	2·00	....	....	1097
0·98	1·20	3·01	4·16	2·56	9·73	7·17	2·34	5·20	14 97	
......	2·50	8·00	....	....	10·00	8·00	3·00	....	....	1098
1·92	2·33	6·40	2·43	3·65	12·48	8·83	3·24	11·34	19 40	
....	2·00	6·00	......	....	12·00	6·00	2 00	....	....	1099
1·92	2·33	4.61	3·08	6·21	13·90	7·69	2·41	8·26	17 92	
....	2·00	8 00	......	....	10 00	8·00	2·00	....	....	1100
1·68	2·04	6·21	3·58	3·01	12.80	9·79	2·49	13·96	18 93	
....	2·00	9·00	....	......	11·00	9·00	2·00	....	....	1101
1·78	2·16	8·96	1·60	2·24	12·80	11.20	2·72	14·20	20 31	
....	4·00	6·00	....	....	7·00	6·00	10·00	....	....	1102
3·26	3·96	2·69	4·99	1·28	8·96	7·68	10·99	10·16	28 47	
....	2·00	....	....	....	....	8.00	3·00	....	....	1103
1·66	2·02	4·48	4·49	0·63	9·60	8·97	3·29	7·44	17 94	
....	3·00	....	....	....	....	9 00	4·00	....	....	1104
2·35	2·86	5·43	3·85	2·07	11·35	9·28	4·90	8·84	22 15	
....	3 00	....	......	....	....	8·00	6·00	....	....	1105
2·35	2·86	2·56	5 59	1·12	9·27	8 15	8·00	4 96	23 60	
....	2·00	....	....	....	....	7·00	4·00	....	....	1106
1·57	1·90	3·84	3·20	1 11	8·15	7·04	4·34	4·52	16 79	
....	3·00	....	......	....	25·00	25·00	....	....	....	1107
2·46	2·99	0·17	12·48	14·55	27·50	27·50	....	3·60	34 74	
2·48	3·01	4·50	....	....	14·10	9·98	1·88	......	....	1108
2·34	2·84	6·39	1·34	6·34	14·07	7·73	1·80	14·12	18 55	
2·66	3·23	5·21	....	......	14·18	9·05	5·63	....	....	1109
2·60	3·16	6·56	3·52	3·83	13·91	10 08	5·78	13·44	25 20	
2·00	2·43	4·74	......	....	14·89	6·97	2·5	....	....	1110
2·24	2·72	7·99	3·20	3·52	14·71	11·19	0·85	13·68	20 43	
2·59	3·15	4·02	....	....	14·54	8·69	5·83	....	....	1111
2·64	3·21	6·70	3·54	3·83	14·07	10·24	4·60	13·88	24 25	

TABLE I.—Statement of the Results of Examining 107 Standard

No. of Sample.	Name of Manufacturer.	By whom sent.	From what Material Produced.	Name or Brand of Fertilizer.
1112	Provincial Chemical Fertilizer Company, St. John, N.B.	Manufacturers	....	'Bone Meal'— Guaranteed.... Found.....
1113	" "	W. Harris & Co. Danforth Avenue, Toronto.	......	'Nitrate of Soda'— Guaranteed .... Found....
1114	Thos. Reid, St. John, N.B.	Manufacturers ...	......	'Reid's Superphosphate'— Guaranteed.... Found....
1115	B. & M. Rattenbury, Charlottetown, P.E.I.	" ...	Blood, bones and tankage.	'No. 1 Fertilizer'— Guaranteed.... Found....
1116	" " ..	"	Blood, bones & tankage mixed with nitrate of soda & potash	'No. 2 Fertilizer'— Guaranteed .... Found....
1117	" " ..	"	......	'Bone Meal'— Guaranteed .... Found ....
1118	Packers Union Fertilizer Company, New York.	"	......	'Wheat, Oats & Clover Fertilizer'— Guaranteed.... Found....
1119	" " ..	"	......	'Economical Vegetable Guano'— Guaranteed.... Found....
1120	" " ..	" ...	......	'Universal Fertilizer.'— Guaranteed.. .... Found....
1121	" " .	"	......	'Animal Corn Fertilizer'— Guaranteed.... Found....
1122	" " ..	"	......	'High Grade Potato Manure'— Guaranteed.... Found....
1123	The Nova Scotia Fertilizer Company, Halifax, N.S.	"	The bone phosphate, potash & ammonia, are obtained from bone, muriate of potash, kainite and animal matter, such as tankage. The bone phosphate being made soluble by the addition of sulphuric acid.	'Ceres Superphosphate'— Guaranteed.. .... Found....
1124	" " ..	"		'Potato Phosphate'— Guaranteed.... Found....
1125	" " ..	" ...		'Apple Tree Phosphate'— Guaranteed .... Found....
1126	" " ..	"		'Strawberry Phosphate'— Guaranteed.... Found....
1127	" " ..	" ...	......	'Bone Meal'— Guaranteed.... Found....
1128	....	Wallace & Fraser, 90 Germain St., St. John N.B.	......	'Thomas' Phosphate Powder'— Guaranteed.... Found....
1129	Albert Manufacturing Co., Hillsborough, N.B.	Manufacturers......	......	'Potato Fertilizer'— Guaranteed .... Found....
	" " ..	"	......	'Grass Fertilizer'— Guaranteed .... Found....

Samples of Commercial Fertilizers Registered for 1900—*Continued.*

RESULTS OF ANALYSIS.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per ton of 2,000 lbs.	No. of Sample.
Total, including that of Nitric Acid or Ammonia, if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate, Soluble.	Insoluble.	Total.	Total, Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
3·57	4·34	...	...	...	24·42	24·42	...	...	...	1112
3·47	4·22	0·32	14·24	9·91	24·47	24·47	...	6·88	34 28	
...	...	...	...	...	...	...	...	...	...	1113
15·82	19·21	...	...	...	...	...	...	0·24	41 13	
...	...	...	...	...	...	...	...	...	...	1114
3·71	4·51	1·22	5.21	4·27	10·70	6·43	1·69	8·06	19 14	
...	...	...	...	...	...	...	...	...	...	1115
4·89	5·93	0·79	1·34	6·85	8·98	8·98	0.66	25·02	21 70	
...	...	...	...	...	...	...	...	...	...	1116
4·87	5·91	0·58	6·21	5·05	11·84	11·84	6·53	8·82	31 13	
...	...	...	...	...	...	...	...	...	...	1117
1·69	2·06	0·51	0·38	17·09	17·98	17·98	0·56	2·66	22 77	
...	...	9·00	2·00	1·00	12·00	11·00	2·00	...	...	1118
...	...	3·52	6·71	4·48	14·71	10·23	1·84	7·54	19 77	
1·25	1·50	4.50	1·50	1·00	7 00	6·00	3·00	...	...	1119
1·57	1·91	5·16	2.64	1·73	9·53	7·80	4·08	6·93	15 87	
0·82	1 00	6·00	2·00	1·00	9·00	8·00	4·00	...	...	1120
1·16	1·41	5·97	3·05	2·11	11·13	9·02	6·10	10·42	17 73	
2·47	3·00	6·00	2·00	1·00	9·00	8·00	2·00	...	...	1121
2·23	2·71	7·03	2·82	2·02	11·87	9.85	2·22	6·01	20 92	
2·05	2·50	6·00	2·00	1·00	9·00	8·00	6·00	...	...	1122
2·02	2·45	5·16	3·68	2·39	11·23	8·84	7·93	8·00	24 14	
...	2·00	...	...	...	...	9·20	2·14	...	...	1123
2·51	3·05	4·15	3·73	2·99	10·87	10·87	2 64	10·94	18 77	
...	3·71	...	...	...	...	7·80	4·70	...	...	1124
3·21	3·90	3·70	2·72	2·47	8·89	8·89	5·03	13·41	21 15	
...	3·25	...	...	...	...	7·80	6·53	...	...	1125
3·16	3·84	3·69	3·02	2·51	9·22	9·22	5·71	10·53	22 08	
...	2·02	...	...	...	...	8·30	6·50	...	...	1126
3·02	3·67	3·36	3·23	2·36	8·95	8·95	5·54	10·75	21 36	
...	4·53	...	...	...	...	22·66	...	...	...	1127
3·86	4·68	...	7·95	13·46	21·41	21·41	...	3·95	31 46	
...	...	...	...	...	17·00	...	...	...	...	1128
...	...	0·16	6·74	11·10	18·00	6·90	...	0·20	15 37	
...	...	...	...	...	6·25	...	0·51	...	...	1129
...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	8·12	...	0·44	...	...	1130
...	...	...	...	...	...	...	...	...	...	

TABLE I.—Statement of the Results of Examining 107 Standard

No. of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
1131	Albert Manufacturing Co., Hillsborough, N.B.	Manufacturers		'Wheat Fertilizer'— Guaranteed / Found
1132		Andrews, Bell & Co., Montreal.		'Basic Slag'— Guaranteed / Found
1133	Pidgeon Fertilizer Co., Windsor, N.S.	Manufacturers		'Ground Bone'— Guaranteed / Found
1134	" "	"	Phosphoric acid from animal bone. Ammonia from nitrate of soda and animal matter. Potash, muriate of potash.	'Eureka Phosphate'— Guaranteed / Found
1135	" "	"		'Eureka Potato Manure'— Guaranteed / Found
1136	" "	"		'Intense Brand' for all root crops— Guaranteed / Found
1137	Parmenter & Polsey Fertilizer Co., Peabody, Mass.	"	Bone, animal tankage, potash and nitrate of soda.	'Star Brand'— Guaranteed / Found
1138	" "	"		'Plymouth Rock Brand'— Guaranteed / Found
1139	Imported from Chili.	M. P. Morris, Vancouver, B.C.		'Nitrate of Soda'— Guaranteed / Found
1140	" "	Victoria Chemical Co., Ltd., Victoria, B.C.		'Nitrate of Soda'— Guaranteed / Found
1141	" "	"		'Kainite'— Guaranteed / Found
1142	" "	"		'Sulphate of Potash'— Guaranteed / Found
1143	" "	"		'Muriate of Potash'— Guaranteed / Found
1144	The Victoria Chemical Co., Limited, Victoria, B.C.	Manufacturers	Treating spent bone char with sulphuric acid.	'Superphosphate'— Guaranteed / Found
1145	" "	"	Nitrate of soda, kainite, superphosphate and sand.	'Mixed Fertilizer'— Guaranteed / Found
1146		Wallace & Fraser, St. John, N.B.		'Thomas' Phosphate Powder'— Guaranteed / Found
1147		"		'Thomas' Phosphate Powder'— Guaranteed / Found

Samples of Commercial Fertilizers registered for 1900.—*Concluded.*

Results of Analysis.								Moisture.	Relative Value per ton of 2,000 lbs.	No. of Sample.
Nitrogen.		Phosphoric Acid.					Potash.			
Total, including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
...	0·50	...	...	...	8·41	...	0·48	...	...	1131
...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	1132
...	...	0·30	2·69	12·24	15·23	2·99	...	0·17	11 89	
...	3·00	...	...	...	...	23·50	·01	...	...	1133
3·66	4·44	...	7·75	14·83	22·58	22·58	...	7·45	32 14	
...	3·00	...	...	...	...	9·00	2·50	...	...	1134
2·95	3 58	3·47	3·22	4 24	10·93	10·93	4·44	13·76	23 68	
...	4·00	...	...	...	...	8·00	5·00	...	...	1135
3·53	4·29	4·10	1·93	2·09	8·12	8·12	7·45	11·75	25 42	
...	4·00	...	...	...	...	7·00	5·50	...	...	1136
3·69	4·48	3·48	2·01	2·05	7·54	7·54	8·52	12·27	26 25	
...	1·14	2·50	...	...	8·00	7·00	...	...	...	1137
1·61	1·95	5·95	2·87	1·60	9·52	9·52	3·07	8·81	17 90	
...	2·47	4·00	...	...	9·00	8·00	...	...	...	1138
2·54	3·08	3·45	3·13	2 20	8·78	8·78	3·19	7·70	19 23	
...	19·00	...	...	...	...	...	...	...	...	1139
15 80	19·20	...	...	...	...	...	...	0·20	41 08	
...	19·00	...	...	...	...	...	...	...	...	1140
15·25	18·52	...	...	...	...	...	...	0·39	39 65	
...	...	...	...	...	...	...	12·00	...	...	1141
...	...	...	...	...	...	...	13·21	5·75	13 87	
...	...	...	...	...	...	...	50·00	...	...	1142
...	...	...	...	...	...	...	49·63	2 63	52 11	
...	...	...	...	...	...	...	50·00	...	...	1143
...	...	...	...	...	...	...	53·04	1·98	55 69	
...	...	15·50	...	...	...	...	...	...	...	1144
...	...	14·00	1·20	2·04	17·24	15·20	0·66	8·97	...	
...	2·20	5·00	...	...	...	...	2·80	...	...	1145
1·61	1·96	4·62	1·26	2·65	8·53	5·88	4·23	6·68	...	
...	...	...	...	...	18·32	Citric Soluble. 15·87	...	...	...	1146
...	...	0·16	8·19	9·95	18·30	Available. 8·35	...	...	16 17	
...	...	...	...	...	18·18	Citric Soluble. 15·87	...	...	...	1147
...	...	0·23	6·60	10·77	17·60	Available. 6·83	...	0·03	15 08	

TABLE II.—Results of the Examination of

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total, calculated as Ammonia.
1900.		*Kentville, N.S.*	*Analyst, Dr. M. Fiset, Quebec.*		p. c.	p. c.
Apl. 26	16770	DeWolf & Lamont	Nova Scotia Fertilizer Co., Halifax.	'Ceres Superphosphate'—		
				Guaranteed	....	2·00
				Standard sample	2·51	3·05
		Wolfville, N.S.		Sample as sold	1·82	2·21
" 26	16771	Starr, Son & Franklin.	Cumberland Potato Fertilizer Co., Portland, Me.	'Potato Fertilizer'—		
				Guaranteed	2·06	2·50
				Standard sample	2·24	2·72
				Sample as sold	2·32	2·82
" 26	16772	Wolfville Coal Co.	Bowker Fertilizer Co., Boston, Mass.	'Farm and Garden'—		
				Guaranteed	.....	2·00
				Standard sample	1·68	2·04
		Dartmouth, N.S.		Sample as sold	1·95	2·36
" 30	16773	E. M. Walker	Pacific Guano Co., Boston, Mass.	'Soluble Pacific Guano'—		
				Guaranteed	2·06	2·50
				Standard sample	2·38	2·88
				Sample as sold	2·60	3·18
" 30	16774	Colin McNab	Alberts' Thomas' Phosphate Co., London, Eng.	'Thomas' Phosphate Powder'—		
				Guaranteed	....	......
				Standard sample	....	......
		St. John, N.B.		Sample as sold	0·31	0·37
" 21	17706	Thos. Reid, Parish of Simonds.	Vendor	'Reid's Superphosphate'—		
				Guaranteed	....	......
				Standard sample	3·71	4·51
				Sample as sold	3·77	4·57
" 23	17707	D. J. Seely & Son, 44 Britain St.	Bowker Fertilizer Co., Boston, Mass.	'Farm and Garden'—		
				Guaranteed	......	2·00
				Standard sample	1·68	2·04
				Sample as sold	2·02	2·45
" 24	17708	Wallace & Fraser, 3 Smyth St.	Chemical Works, late H. & E. Albert, London, Eng.	'Thomas' Phosphate Powder'		
				Guaranteed	......	......
				Standard sample	......	......
				Sample as sold	0·23	0·29
		Fredericton, N.B.				
" 27	17709	W. T. Estey, Queen Street.	Parmenter & Polsey Fertilizer Co., Peabody, Mass.	'Plymouth Rock'—		
				Guaranteed	....	2·47
				Standard sample	2·54	3·08
				Sample as sold	2·97	3·60
" 27	17710	J. F. Vanbuskirk, Phœnix Square.	Provincial Chemical Fertilizer Co., St. John, N.B.	'Potato Phosphate'—		
				Guaranteed	2·66	3·23
				Standard sample	2·60	3·16
				Sample as sold	1·46	1·77
		Coaticook, Que.				
" 2	19676	C. E. Baldwin, Farmer.	Read Fertilizer Co., N.Y.	'Leader Guano'—		
				Guaranteed	......	......
				Standard sample	......	......
				Sample as sold	1·22	1·48

59 Samples of Fertilizers as sold in 1900.

Results of Analysis.									
Phosphoric Acid.							Relative value per ton of 2,000 lbs	No. of Sample.	Official Analyst's Remarks.
Soluble in Water.	Reverted or Citrate soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
......	......	......	......	9·20	2·14	......	......	16770	
4·15	3·73	2·99	10·87	10·87	2·64	10·94	18 77		
3·04	3·52	2·87	9·43	9·43	3·00	18·52	17 91	......	Genuine—up to guarantee.
5·00	3·00	2·00	10·00	8·00	3·00	......	17 99	16771	
6·62	2·91	3·10	12·63	9·53	4·52	10 93	22 28		
7·04	4·01	1·91	12·96	11·05	3·21	14·44	22 57	......	" "
8·00	......	......	10·00	8·00	2·00	......	......	16772	
6·21	3·58	3·01	12·80	9·79	2·49	13·96	18 93		
4·80	4·32	2·23	11·35	9·12	1·83	12·40	17 78	......	" "
5·00	3·00	2.00	10 00	8·00	1 50	......	16 42	16773	
8·15	1·83	2·24	12·22	9·98	1·50	12 05	19 78		
7·03	2·73	1·75	11·51	9·76	1·73	18·64	20 03	......	" "
......	......	......	17 00	......	......	......	......	16774	
0·23	6·60	10·77	17·60	6·83	......	......	15 08		
0·80	6·82	5·49	13 11	7·62	......	0·04	13 04	......	Adulterated being below guarantee, in total phosphoric Acid.
......	......	......	......	......	......	......	......	17706	
1·22	5·21	4·27	10·70	6·43	1·69	8·06	19 14		
1·44	7·84	3·35	12 63	9·28	1·53	24·32	22 02	......	No guarantee given.
8·00	......	......	10 00	8 00	2·00	......	......	17707	
6·21	3·58	3 01	12·80	9·79	2·49	13·96	18 93		
5·60	3·36	1·75	10·71	8·96	2·42	13·68	18 34	......	Genuine—up to guarantee.
......	......	......	17 00	......	......	......	......	17708	
0·23	6·60	10·77	17·60	6·83	......	......	15 08		
0·96	4·85	7 00	12·81	5·81	......	......	11 94	......	Adulterated, being below guarantee, in total phosphoric Acid.
4·00	......	......	9·00	8·00	......	......	......	17709	
3·45	3·13	2·20	8·78	8·78	3·19	7·90	19 23		
6·56	2·71	1·44	10·71	9·27	4·11	7·00	22 73	......	Genuine and up to guarantee.
5·21	......	......	14·18	9·05	5·63	......	......	17710	
6·56	3·52	3·83	13·91	10 08	5 78	13·44	25 20		
8 31	3·37	2 07	13·75	11·68	4·57	14·36	22 60	......	Genuine, but below guarantee in Ammonia and potash.
......	......	Not registered for 1900.			......	......	......	19676	
......	......	......	......	......	......	......	......		
4·80	4·57	1·43	10·80	9·37	1·73	14·56	15 97	......	No guarantee given.

TABLE II.—Results of the Examination of 59

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1900.		*Coaticooke*—Con.	*Analyst, Dr. M. Fiset.*		p. c.	p. c.
April 2	19677	C. E. Baldwin, Farmer.	Read Fertilizer Co., N.Y.	'Standard Superphosphate'—		
				Guaranteed	....	....
				Standard sample	....	....
				Sample as sold	0·90	1·09
" 2	19678	" "	" "	'Potato Special'—		
				Guaranteed	....	....
				Standard sample	....	....
		Sherbrooke, Que.		Sample as sold	1·27	1·55
" 2	19679	C. N. Genest, King Street.	Wallace & Fraser, St. John, N.B.	'Thomas Phosphate Powder'—		
				Guaranteed	....	....
				Standard sample	....	....
				Sample as sold	0·24	0·29
" 2	19680	Coderre Fils & Co., Wellington St.	Pacific Guano Co., Boston, Mass.	'Soluble Pacific Guano'—		
				Guaranteed	2·06	2·50
				Standard sample	2·38	2·88
				Sample as sold	2·06	2·50
		Quebec.				
" 10	19681	P. T. Legare, St. Paul St.	Nichols Chemical Co., Capelton, Que.	'No. 1 Superphosphate'—		
				Guaranteed	....	....
				Standard sample	....	....
				Sample as sold	0·07	0·09
" 10	19682	" "	" "	'Royal Canadian'—		
				Guaranteed	....	4·00
				Standard sample	4·27	5·19
				Sample as sold	3·01	3·66
" 10	19683	" "	" "	'Capelton Superphosphate'—		
				Guaranteed	....	....
				Standard sample	....	....
				Sample as sold	0·24	0·29
" 10	19684	" "	"	'Reliance'—		
				Guaranteed	....	2·00
				Standard sample	2·67	3·25
		St. Armand W., Que.		Sample as sold	0·97	1·17
" 6	19688	J. E. Primerman, Farmer.	Bradley Fertilizer Co., Boston, Mass.	'Potato Fertilizer'—		
				Guaranteed	2·06	2·50
				Standard sample	2·06	2·50
				Sample as sold	2·10	2·55
6	19689	" "	" "	'XL Superphosphate'—		
				Guaranteed	2·07	2·50
				Standard sample	2·29	2·79
				Sample as sold	2·43	2·96

Samples of Fertilizers as sold in 1900—*Continued.*

Results of Analysis.									
Phosphoric Acid.									
Soluble in Water.	Reverted or Citrate soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.	Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
Not registered for 1900.								19677	
7·20	2·23	1·27	10·70	9·43	4·20	14·04	18 04	......	No guarantee given.
Not registered for 1900.								19678	
2·56	2 57	2·55	7·68	5·13	8·34	9·40	18 47	......	" "
....	....	....	17·00	....	....	....	....	19679	
0·23	6·60	10·77	17·60	6·83	......	......	15 08		
0·64	2 09	7·19	9·92	2·73	Trace.	0·24	8 69	......	Below guarantee in phosphoric acid; and adulterated under the Act.
5 00	3·00	2·00	10·00	8·00	1·50	....	16 42	19680	
8·15	1·83	2·24	12·22	9·98	1·50	12·05	19 78		
3·84	5·73	3·03	12·60	9·57	2·87	12·12	19 79	......	Genuine and up to guarantee.
......	......	......	......	11·50	......	....	....	19681	
10·70	3·82	2·24	16·76	14 52	......	11·76	17 71		
9·59	6·25	2·71	18·55	15·84	0·72	12·88	20 12	......	" "
....	....	....	....	9·00	5·00	....	....	19682	
8·96	2 24	1·60	12·80	11·20	6·68	7·62	30 95		
8·31	3·69	1·27	13·27	12·00	4·72	11·24	26 59	......	Genuine, but below guarantee in ammonia.
....	....	......	....	8·00	....	....	......	19683	
7·36	3·84	3·00	14·20	11·20	......	13·00	13 95		
7·52	4·80	1·75	14·07	12·32	0·30	13·08	15 73	......	Genuine and up to guarantee.
....	......	....	....	6·00	2·00	....	......	19684	
4·63	4·33	4·48	13·44	8·96	2·70	9·35	20 91		
7·51	4·65	2·07	14·23	12·16	1·42	13·20	18 58	......	Genuine, but below guarantee in ammonia.
5·00	3·00	2·00	10·00	8·00	3·00	....	17 99	19688	
6·08	4·47	3·01	13·53	10·55	3·57	10·98	21 81		
6·56	3·24	1·76	11·56	9·80	3·00	15·80	20 15	......	Genuine and up to guarantee.
8 00	......	....	10·00	....	1·00	....	....	19689	
5·95	4·02	3·01	12·98	9·97	2·49	13·20	20 58		
7·68	3·84	1 91	13·43	11·52	2·32	16·04	22 22	......	" "

TABLE II.—Results of the examination of 59

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total, calculated as Ammonia.
1900.		*Bedford, P.Q.*	*Analyst, Prof. E. B. Kenrick, Winnipeg.*		p. c.	p. c.
April 6	19690	E. T. Currie	NicholsChemicalCo., Capelton, P.Q.	'Victor Guano'—		
				Guaranteed	....	2·00
				Standard sample	2·83	3·43
				Sample as sold	1·62	1·97
" 6	19691	"	" "	'Reliance'—		
				Guaranteed	......	2·00
				Standard sample	2·67	3·25
				Sample as sold	2·34	2·84
		Montreal.				
" 12	19692	Brodie & Harvie, 8 Bleury St.	Standard Fertilizer Co., Smith's Falls.	'Standard'—		
				Guaranteed	....	2·50
				Standard sample	2·59	3·15
				Sample as sold	2·49	3·02
" 12	19693	" "	" "	'Special'—		
				Guaranteed	....	3·50
				Standard sample	2·80	3·40
				Sample as sold	3·06	3·72
" 16	19694	Laing Packing Co., 82 Catherine St.	Vendors	'Tankage'—		
				Guaranteed	4·12	5·00
				Standard sample	5·12	6·22
				Sample as sold	3·74	4·54
		Sutton, P.Q.				
" 17	19695	A. A. Robinson	Read Fertilizer Co.	'Leader Guano'—		
				Guaranteed	....	Not
				Standard sample	....	....
				Sample as sold	1·01	1·23
" 17	19696	"	" "	'Fish, Bone and Potash'—		
				Guaranteed	....	Not
				Standard sample	....	......
				Sample as sold	2·49	3·02
" 17	19697	C. O. Smith	Pacific Guano Co., Boston, Mass.	'Potato Special'—		
				Guaranteed	2·06	2·50
				Standard sample	2·35	2·85
				Sample as sold	2·21	2 68
" 17	19698	Greeley Bros. & Thompson.	Standard Fertilizer Co., Smith's Falls.	'No. 1 Fertilizer'—		
				Guaranteed	....	1·50
				Standard sample	1·24	1·50
				Sample as sold	1·50	1·82
" 17	19699	C. O. Smith	Pacific Guano Co., Boston, Mass.	'Nobsque Guano'—		
				Guaranteed	1·03	1·25
				Standard sample	1·46	1·77
				Sample as sold	1·42	1·72

Samples of Fertilizers as sold in 1900—*Continued.*

Results of Analysis.									
Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs	No. of Sample.	Official Analyst's Remarks.
Soluble in Water.	Reverted or Citrate soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
......	......	......	......	7·00	3·00	......	......	19690	
6·23	3·37	2·24	11·84	9·60	3·94	11·27	22 78		
5·78	1·53	4·52	11·83	7·31	3·52	12·56	17 67		Genuine.
......	......	......	......	6·00	2·00	......	......	19691	
4·63	4 33	4·48	13.44	8·96	2·70	9·35	20 91		
4·37	1·52	3·70	9·59	5·89	2·38	11·15	16 09		"
......	......	......	11·00	9·00	2·00	......	......	19692	
5·75	0·77	12·28	18·80	6·52	2·58	10·90	20 34		
8·38	1·84	4·26	14·48	10·22	2·51	14·61	21 97		"
......	......	......	10·00	8·00	6·00	......	......	19693	
5·00	0·91	9·06	14·07	5·91	8·07	9·30	24 99		
6·83	1.18	4·08	12·09	8·01	7·30	8·15	25 37		"
......	......	......	14·71	......	......	5·52	......	19694	
0·77	7·46	9·56	17·79	17·79	0·42	7·48	31 43		
trace.	7·76	12·66	20·42	20·42	......	12·68	30 18		Below guarantee in nitrogen, above in phosphoric acid.
registered for 1900......			......	......	......	......	......	19695	
4·28	2 56	1·05	7·89	6·84	2·21	14·80	13 01		Not guaranteed.
registered for 1900......			......	......	......	......	......	19696	
3·07	1·30	2·53	6·90	4·37	5·08	9·93	18 95		"
6·00	2·00	1·00	9·00	8·00	3·00	......	17 79	19697	
6·29	3·11	4·03	13·43	9·40	2·74	10·70	20 70		
6·22	3·24	2·03	11·49	9·46	3·47	16·62	20 57		Genuine.
......	......	......	12·00	9·00	1·00	......	......	19698	
5·75	1·03	12·54	19·32	6·78	1·48	12·00	16 42		
8·25	1 04	4·37	13·66	9·29	1·56	17·96	17 59		"
5·00	3·00	1·00	9·00	8·00	2 00	......	14 17	19699	
5·59	2·48	2·49	10·56	8·07	2·04	16·70	14 83		
5·42	2·18	1·83	9·43	7·60	2·77	16·32	15 77		"

TABLE II.—Results of the Examination of 59

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total. including that of Nitric Acid or Ammonia if prenset.	Nitrogen. Total, calculated as Ammonia.
1900.		*Ottawa.*	*Analyst, Dr. F X. Valade, Ottawa.*		p. c.	p. c.
April 4	20680	Graham Bros., florists, &c.	W. A. Freeman Co., Hamilton Co.	'Potato Manure'—		
				Guaranteed ..	....	3·00
				Standard sample..	3·96	4·81
				Sample as sold..	2·10	2·55
" 4	20681	" "	" "	'Tankage'—		
				Guaranteed	....	5·00
				Standard sample..........	6·92	8·40
		Brockville, Ont.		Sample as sold	4·62	5·61
" 5	20682	H. Brown & Sons.	Bradley, Fertilizer Co., Boston, Mass.	'Bradley's Potato Fertilizer'—		
				Guaranteed	2·06	2.50
				Standard sample..	2·06	2·50
				Sample as sold..	1·68	2·04
" 5	20683	" "	" "	'Bradley's Complete Manure for Potatoes and Vegetables'		
				Guaranteed	....	From
				Standard sample.........	....	... .
				Sample as sold..	2·38	2·89
" 5	20684	" "	" "	'Bradley's Dissolved Bone with Potash'—		
				Guaranteed ..	0·82	1·00
				Standard sample.........	1·43	1·73
				Sample as sold......	0·84	1·02
		Smith's Falls, Ont.				
" 5	20686	The Standard Fertilizer and Chemical Co.	Vendors	'Special Fertilizer'—		
				Guaranteed	... .	3·50
				Standard sample..........	2·80	3·45
				Sample as sold....	2·80	3·46
" 5	20687	" "	"	'No. 1 Fertilizer'—		
				Guaranteed	... ...	1·50
				Standard sample..........	1·24	1·50
				Sample as sold..	1·47	1·79
" 5	20688	" "	"	'Standard Fertilizer'—		
				Guaranteed	....	2·50
				Standard sample..	2·59	3·15
				Sample as sold..	2·03	2·47
" 5	20689	Standard Fertilizer and Chemical Company.	Vendors..	'Corn and Grass Fertilizer'—		
				Guaranteed	... .	2·00
				Standard sample..........	2·35	2·85
				Sample as sold.	2·28	2·75
" 5	20690	" ...	"	'Royal'—		
				Guaranteed	....	2·00
				Standard sample.......	1·91	2·31
				Sample as sold.......	2·64	3·20

Samples of Fertilizers as sold in 1900—*Continued..*

Results of Analysis.							Relative value per ton of 2,000 lb.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.									
Soluble in Water.	Reverted or Citrate soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
....	....	......	8·00	....	5·00	....	....	20680	
5·44	2·51	2·18	10·13	7·95	6·14	4·51	25 89		
5·96	0·92	3·60	10·48	6·88	5·00	4·41	19 53	.....	Slightly below guarantee in ammonia.
....	....	....	12·00	....	....	......	......	20681	
....	6·38	5·67	12·05	12·05	....	9·41	29 30		
0·89	4·40	6·16	11·45	11·45	0·73	8·81	23 93	......	Genuine.
5·00	3·00	2.00	10·00	8·00	3·00	....	17 99	20682	
6·08	4·47	3·01	13·56	10·55	3·57	10·98	21 81		
6·14	2·27	1·90	10·31	8 41	3·28	17·02	17 91	......	Up to guarantee.
last year's stock.		Not registered this year.			....	....	....	20683	
2·98	3·69	4·01	10·68	6·67	6·92	12·56	21 82	......	Not guaranteed.
5·00	3·00	2·00	10·00	8·00	2·15	....	15 03	20684	
5·60	2·88	1·92	10·40	8·48	2·21	18·20	16 22		
4·55	2·98	2·99	10·52	7·53	2·33	13·38	14 11	.. . .	Up to guarantee.
....	....	...	10·00	8·00	6·00	....	....	20686	
5·00	0·91	9·06	14·97	5·91	8·07	9·30	24 99		
5·96	1·49	4·56	12·01	7·45	7·75	9·04	25 02	......	"
....	......	....	12·00	9·00	1·00	....	....	20687	
5·75	1·03	12·54	19·32	6·78	1·48	12·00	16 42		
4·96	1·14	8·14	14·24	6·10	1·51	13·37	14 76	......	Below guarantee in available phosphoric acid. Adulterated.
....	....	....	11·00	9·00	2·00	....	....	20688	
5·75	0·77	12·28	18·80	6·52	2·58	10·90	20 34		
7·95	0·71	6·96	15·62	8·68	2·18	11·38	19 57	.. ...	Up to guarantee.
....	......	....	9·00	7·00	4·00	....	....	20689	
5·90	1·13	11·26	18·29	7·03	3·80	11·00	21 33		
9·27	0·90	7·48	17·65	10·17	4·57	10·90	24 62	.. ..	Up to standard and guarantee.
....	....	......	....	8·00	3·00	.....	......	20690	
6·07	.....	12·73	18·80	6·07	3·55	10·50	19 41		
9·03	1·08	7·54	17·65	10·11	4·17	10·45	25 01	......	" "

TABLE II.—Results of the Examination of 59

Date of Collection.	No. of Sample.	Name and Address of — Vendor.	Name and Address of — Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.		Nitrogen. — Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. — Total, calculated as Ammonia.
1900.		*Toronto.*	*Analyst. Dr. W. H. Ellis, Toronto.*			p. c.	p. c.
April 12	20691	J. A. Simmers....	W. A. Freeman Co., Ltd., Hamilton, Ont.	'Potato Manure'—			
					Guaranteed	....	3·00
					Standard sample	3·96	4·81
					Sample as sold	4·76	5·77
" 12	20692	"	"	'Celery and Early Vegetable'			
					Guaranteed	......	6·00
					Standard sample	6·28	7·63
					Sample as sold	6·23	7·56
" 12	20693	"	"	'Sure Growth Manure'—			
					Guaranteed	......	3·50
					Standard sample	4·52	5·48
					Sample as sold	4·45	5·40
" 12	20694	The Steele, Briggs Seed Company.	W. Harris & Co., Toronto.	'Bone Meal'—			
					Guaranteed	....	.....
					Standard sample	4·66	5·66
					Sample as sold	4·79	5·81
" 12	20695	"	Imported	'Sulphate of Potash'—			
					Guaranteed	....	......
					Standard sample	....	....
					Sample as sold	....	....
" 12	20696	"	"	'Muriate of Potash'—			
					Guaranteed	....	....
					Standard sample	....	....
					Sample as sold	....	......
" 12	20697	Wm. Rennie	"	'Nitrate of Soda'—			
					Guaranteed	....	....
					Standard sample	....	....
					Sample as sold	15·90	19·30
		Ottawa.					
" 17	20698	Graham Bros., Seedsmen, &c.	Wm. Faint, Peterborough, Ont.	'Ground Bone'—			
					Guaranteed	....	.....
					Standard sample	4·28	5·20
					Sample as sold	4·32	5·24
		Toronto.	*Analyst, F. T. Harrison, London, Ont.*				
" 2	19333	J. A. Simmers, King St.	W. Harris & Co., Toronto.	'Brand "H"'—			
					Guaranteed	....	......
					Standard sample	7·14	8·67
		Barrie, Ont.			Sample as sold	7·15	8·68
" 3	19334	Wm. Taylor......	W. A. Freeman Company, Hamilton, Ont.	'Freeman's Pure Bone'—			
					Guaranteed	.....	3·00
					Standard sample	2·90	3·52
					Sample as sold	3·42	4·15
" 3	19335	"	"	'Sure Growth'—			
					Guaranteed	....	3·50
					Standard sample	4·52	5·48
					Sample as sold	4·55	5·53

Samples of Fertilizers as sold in 1900—*Continued.*

Results of Analysis.									
Phosphoric Acid.							Relative value per ton of 2,000 lbs	No. of Sample.	Official Analyst's Remarks.
Soluble in Water.	Reverted or Citrate soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
....	....	....	8·00	....	5·00	....	....	20691	
5·44	2·51	2·18	10·13	7·95	6·14	4·51	25 89		
5·99	1·49	2·75	10·23	7·48	4·58	12·02	25 89	......	Up to standard and guarantee.
....	....	....	9.00	....	6 00	....	....	20692	
5·10	1·82	2·50	9·42	6·92	8 17	4·55	32 52		
5 27	1 77	2·17	9·21	7·04	7 73	8·27	32 31	......	" "
....	....	....	8·00	....	3·00	....	....	20693	
6·05	1·87	3·20	11·12	7·92	3·98	4·84	25 31		
6 55	1·19	1·85	9.59	7·74	3·27	11·65	23 83	......	" "
....	....	....	....	....	....	....	....	20694	
0·45	8·05	11·65	20·15	20·15	0·50	4·12	32 74		
....	7·29	11·90	19·19	19·19	....	3·05	31 42	......	" "
....	....	....	....	....	....	....	....	20695	
....	....	....	....	....	....	....	....		
....	....	....	....	....	45·49	1·95	47 76	......	Genuine.
....	....	....	....	....	....	....	....	20696	
....	....	....	....	....	....	....	....		
....	....	....	....	....	52·14	....	54 75	......	"
....	....	....	....	....	....	....	....	20697	
....	....	....	....	....	....	....	....		
....	....	....	....	....	....	0·20	41 34	......	"
....	....	....	....	....	....	....	....	20698	
0·77	5·31	15·67	21·75	21·75	0·39	5·32	33 11		
Trace.	11·26	12·54	23·80	23·80	....	5·20	35 30	......	Up to standard.
....	....	....	....	....	....	....	....	19333	
0·45	3·52	7·04	11·01	11 01	0·50	5·38	24 19		
0·32	3·58	3·90	7·80	7·80	0·31	8·58	25 70	......	No guarantee given.
....	....	....	23·00	23·00	....	....	....	19334	
....	7·84	16·88	24·72	24·72	....	5·27	32 46		
....	8·76	14·65	23·41	23·41	....	4·65	32 50	......	Genuine.
....	....	....	8·00	....	3·00	....	....	19335	
6·05	1·87	3·20	11·12	7·92	3·98	4·84	25 31		
6·14	1·60	2·36	10·10	7·74	3·07	9 82	23 98	......	"

TABLE II.—Results of the Examination of 59

Date of Collection.	No. of Sample.	Name and Address of — Vendor.	Name and Address of — Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. — Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. — Total calculated as Ammonia.
1900.		*Hamilton, Ont.*	*Analyst, F. T. Harrison, London, Ont.*		p. c.	p. c.
April 4	19336	J. A. Bruce, Seed Merchant.	....	'Thomas' Phosphate'— Guaranteed	....	.....
				Standard sample...	....	.....
				Sample as sold....	....	.....
" 4	19338	W. A. Freeman Co., Ltd.	Vendors	'Sure Growth'— Guaranteed	......	3·50
				Standard sample...	4·52	5·48
				Sample as sold..	4·34	5·27
" 4	19339	"	"	'Bone Meal'— Guaranteed	....	3·00
				Standard sample...........	2·90	3 52
		St. Catharines.		Sample as sold..	3·63	4·40
" 4	19337	Titterington & Co.	Bradley Fertr. Co., Boston.	'Guano'— Guaranteed	2.06	2·50
				Standard sample...... . ..	1·49	1·80
		Ingersoll, Ont.		Sample as sold.......... ...	2·01	2·44
" 7	19340	Ingersoll Packing Co.	Vendors..	'Blood, Bone and Tankage'— Guaranteed	7·41	9·00
				Standard sample....... ..	7·84	9·52
		Seaforth, Ont.		Sample as sold.............	6·58	8·00
" 9	19342	Read & Wilson...	Bowker Fertr. Co., Boston.	'Sure Crop'— Guaranteed	....	Not
				Standard sample........ ...	....	....
				Sample as sold..	8·13	9·88

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Samples of Fertilizers as sold in 1900—*Concluded.*

Results of Analysis.							Relative value per ton of 2,000 lbs	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
....	....	....	17·00	....	....	....	....	19336	
0 23	6·60	10·77	17·66	6·83	....	....	15 08		
0·38	5·83	9·85	16·06	6·31	....	....	13 76	.....	Adulterated on account of containing less than 8·00 p. c. of available phosphoric acid as required by the Act.
....	....	....	8·00	....	3·00	....	....	19338	
6·05	1·87	3·20	11·12	7·92	3·98	4·84	25 31		
5·75	1·33	3·73	10·81	7·08	3·16	11·30	23 22	......	Genuine.
....	....	....	23·00	23·00	....	....	....	19339	
....	7·84	16·88	24·72	24·72	....	5·27	32 46		
....	10·42	13·82	24·24	24·24	....	5 35	33 99	.....	"
5·00	3·00	2·00	10·00	8·00	1·50	....	16 42	19337	
6·90	2·88	3.20	12·98	9·78	1·85	11·00	17 93		
6·07	2·18	2·37	10·62	8·25	1·75	14·85	17 05	......	"
....	5·50	6·80	....	....	....	6·00	30 63	19340	
1·09	5·63	6·08	12·80	12·80	0·48	10·54	32 90		
0·96	4·93	7·67	13·56	13·56	....	8·60	30 03	......	"
registered under this name.								19342	
5·31	2·50	2·87	10·68	7·81	1·78	18·00	31 36		

MEMORANDA ON MANURES.

Since this publication is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared regarding the application of natural manures and artificial fertilizers.

It is nearly fifty years since Stockhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarrassment and possibly ruin.

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for, when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it. As regards the best way of doing this, Hellriegel,* has related his experience. He recognizes how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to see a distinct difference between the unmanured plots and the manured field, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the developement of the grains. In the event of such a distinct difference being invisible the manure is justly dircredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every year would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of the fertilizers afterwards applied.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

*Düngungsversuch und Vegetationsversuch ; Berlin, 1897.

In many of the fertilizers described in this and former reports their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the nitrogen of the atmosphere. Nevertheless the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from $8 to $14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables, or produce upon his own farm.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one-half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable-yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff, this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The later experiments of Heiden and Holdefleiss place it at 23·4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when, as is very frequently the case in Canada, the manure is treated with the grossest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the barnyard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 lbs. is produced in fresh condition annually by each animal, and that it contains 0·4 per cent of nitrogen, it follows that a loss of 72 lbs. of nitrogen, worth $8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with 2 lbs. of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about $2.50 annually for each 1,000 lbs. live weight, but, by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg in 1859, entitled 'Ein Pfund Stickstoff kaum einen Groschen' which may be freely translated 'A pound of nitrogen for a penny,' Dr. Meyer-Altenberg maintained that ground gypsum is the very best preservative of barnyard manure when applied in the stable, because it secures 'certainty and completeness of effect, ease of execution, and the lowest possible cost.' He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition, without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out that the use of gypsum, without subsequent careful treatment of the dungheaps, does not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. König's prize essay 'How can the farmer preserve and increase the stock of nitrogen on his property?' (Berlin, 1887.) In a special chapter of this work the author discusses 'The evolution of free nitrogen during the fermentation and storage of stable manure,' describes the experiments which were made from 1860 to 1885 regarding its treatment and gives finally the results of the discussion from which the following sentences may be translated with advantage :—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.

2. This loss is the greater the more the atmosphere has access to the decomposing mass.

3. Too much moisture is just as hurtful as too little. Stable manure requires such a degree of humidity as permits its components to lie close to each other.

4. The addition of substances which fix ammonia (such as gypsum, kainite and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little or no value if care is not taken at the same time to prevent as much as possible the access of air.*

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

One thing in connection with this question is perfectly certain and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further, if the work from which the foregoing quotations have been made be carefully studied, and also the experiments and writings of Holdefleiss, Vogel and others, it appears to be quite certain that the use of the same article, or of the gypsum produced in the manufacture of 'acid-phosphate,' completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure, after treatment with gypsum, on to the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past, at the Central Experimental Farm by Director Saunders. (See Reports for 1898.)

Not only has the addition of substances which have the faculty of fixing ammonia been recommended for stable manure, but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March, 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessmann, Chemist for that institution :—

'*The practice of adding to the manurial refuse materials of the farm as stable manure, vegetable compost, &c., such single commercial manurial substances as will enrich them in the direction desirable for any particular crop to be raised, does not yet receive that degree of general attention which it deserves*' (The italics are in the original.) An addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid in the form of fine ground South Carolina or Florida soft phosphate, &c., will in many instances not only improve their general fitness as complete manure, but quite frequently permit a material reduction in the amount of barn-yard manure ordinarily considered sufficient to secure satisfactory results.

'Average composition of seventy-five samples of barn-yard manure :—

	Per cent.	Lbs. per ton.
Moisture	67·00	1,340·0
Nitrogen	0·52	10·4
Potassium Oxide	0·56	11·2
Phosphoric Acid	0·39	7·8

'The average barn-yard manure contains, it will be noticed from the above statement, a larger percentage of nitrogen, as compared with its potash and phosphoric acid than is generally considered economical. An addition of from thirty to forty pounds of muriate of potash, and of one hundred pounds of fine ground natural phosphate (soft Florida or South Carolina floats) per ton of barn-yard manure would greatly increase its value as an efficient and economical general fertilizer.'

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents in which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous. No better application can be made of the wood ashes produced in the farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps, by a judicious course of crop rotation. For more than a century agricultural chemists have discussed the question as to whether free atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosæ, such as beans, pease, lentils, vetches, clovers, alfalfa, serradella, &c. Even the great English agriculturists, Sir J. B. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert, at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891. Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says: 'Lupines require so little manure that they in fact replace it; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land.'

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without results up to the present hour.

Professor König, of Münster, gives the following summary of Schultz's experience:—

'Schultz acquired the farm Lupitz in the year 1855; its soil consisted of a poor, cold diluvial sand; the profit in working it was very small. Lupines yielded indeed as fodder tolerable results, but when used as green manuring for rye and oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total results was not satisfactory.

'Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation, and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine "sick." Schultz made his first trial on this field, manuring it with 300 pounds kainite per morgen (1 Prussian morgen = 0·631 acre); the sickness was at once cured, and for twenty-five years afterwards Schultz has grown lupines on this ground without interruption, always with the application of 300 pounds kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, 300 pounds kainite were applied here and ploughed in the fall, the ground was cured, although an application of phosphates had not produced the desired results.

'The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results according to the nature of the crops which preceded the grain. For instance, while grain sowed after lupines and manured with potash and phosphates yielded very good and remunerative harvests, these were not to be obtained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way: that lupines as deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops: that, on the other hand, the application of potash and phosphates to grain, after a preceding grain crop, is without effect, for the reason that the latter had consumed the stock of nitrogen. Grain crops always reduce this stock; never increase it. Schultz has given the name "nitrogen collectors" to the lupines and similar plants, while grains are called 'nitrogen consumers.' His system of rotation is therefore the following:—Sow first nitrogen collectors (lupines, pease, beans, vetches, clover, lucerne, serradella, &c.), or, as they have been called, renovating crops, and give them 300 lbs. kainite per morgen, with perhaps an addition 20 lbs phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 lbs. kainite and 20 lbs. phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element.'

The foregoing description is taken from Professor Konig's 'Stickstoff Vorrath,' published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel, and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work.—

1. 'Pease, alfalfa, serradella lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

2. 'There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.

3. 'That there is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.

4. 'The cereals with which the experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.

5. 'In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro organisms or their spores were floating in the air and were deposited in the pots in which the plants grew.

6. 'As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.

7. 'In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where they were no root tubercles: it was especially large with oat plants, and largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.

'Practical inferences:—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, pease, beans, vetches and cow pease as renovating crops, and enforces the importance of these crops to restore fertility to exhausted soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care to collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder.'

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in appropriating and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebigs teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses in fertilizing material, which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn-yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric ac d and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be in the highest degree imperfect. At Berlin it has been proved, that of the nitrogen contained in its sewage, at the very most only 13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a source of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds, several feet in thickness lying above the peat. The following tests have been made in the Inland Revenue Laboratory, of moss litter from various localities in the Dominion :—

—	Moisture. per cent.	Ash. per cent.	Nitrogen. per cent.
Moss Litter, Berwick, N.S	14·40	1·16	1·26
Black Muck " "	13·30	3·68	1·58
Sphagnum moss from Shippegan, N.B.	12·45	1·55	0·55
Light coloured moss litter from Lincoln Parish, N.B.	11·55	1·40	1·79
Dark coloured sample from the foregoing locality	10·95	0·80	1·06
Moss litter from Musquash, N.B., upper layer	11·50	0·95	0·82
Moss litter from same locality, lower layer	12·50	0·90	0·72
Peat from St. Bridget, Prov. Quebec	13·30	2·50	1·48
Peat from St. Hubert, Quebec	12·35	2·68	1·84
Light coloured moss litter from Caledonia Springs	10·00	1·60	2·95
Dark coloured moss litter from same locality	11·60	2·70	2·23
Peat from the same locality	10·95	3·90	2·94
Surface moss from the Mer Bleue at Eastman's	10·85	2·80	0·71
Surface moss from the Mer Bleue at Baldwin's Farm	7·90	2·66	1·47
Surface moss from the Mer Bleue at Baldwin's Farm 18 inches deep	27·90	1·72	1·64
Peat from Mer Bleue at McFadden's Farm, wide ditch, Navan	22·60	4·40	2·21
Peat from Mer Bleue, McFadden's Farm, narrow ditch, Navan	9·40	6·62	2·80
Peat from near Stratford, Ont	16·80	9·10	1·91
Hypnum moss from near Stratford, Ont	8·75	9·72	2·01
Moss litter from bog in Welland County, Ont	3·85	4·70	1·51
Peat lying underneath the foregoing	5·30	4·85	1·41
Peat from same locality, lying 4½ feet below surface	3·25	41·25	1·52

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also practised in Congleton, Cheshire, England. In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs. It, of course, at once recalls the dry earth system, regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purposes in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss litter will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is value-less from an agricultural point of view, but this is not the case with moss litter, which as the above analysis shows, often contains as much nitrogen as ordinary barn-yard manure. Numerous analyses have been made of moss litter manure as produced in Germany, and its average contents from seven different towns may here be stated.

	p. cent.	lbs. per ton.		Value per ton.
Nitrogen..................	0·664	13·28	at 13c.	$1 72
Phosphoric acid	0·350	7·00	5	0 35
Potash....................	0·285	5·70	5¼	0 30
Water.....................	83·00			$2 37

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and also in Welland County, Ontario. From the latter locality I was supplied with several bales of the moss litter for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reported that 100 pounds of moss litter were sufficient for drying 800 pounds of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in my office without attracting notice, and indeed it was quite devoid of odour. Its analysis gave the following results :—

	Per cent.	Pounds per ton.		Value per ton.
Nitrogen	1·31	26·2	at 13c.	$3 41
Phosphoric acid	0·90	18·0	at 5	0 90
Potash	0·14	2·8	at 5¼	0 15
Water	65·47			$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about $2 per ton ; with 67 per cent water, as in the case of the average given above by Dr. Goessmann, the value is nearly $2.25. Therefore, much better results might be expected agriculturally from a 'moss manure' of the composition just described.

Moss litter might also be applied with great advantage in public urinals. When a sample of it was supersaturated with urine and dried, and this process repeated several times, no offensive odours were developed and the product was found on analysis to contain 12·41 per cent of nitrogen which is equal to a valuation of $29.78 per ton.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great advantage on agriculture.

APPENDIX N.

BULLETIN No. 71.—CREAM OF TARTAR.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, September 10, 1900.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—I have the honour herewith to return you file 81857, accompanied by a report upon the analysis of 65 samples of Cream of Tartar which have been collected and examined in accordance with your instructions contained in the file above mentioned.

The samples analysed were taken in different cities and towns throughout the Dominion, as shown in detail in the accompanying report; and I beg to recommend that this report be published as Bulletin 71 of the series issued from this laboratory.

The collections were made in June of this year, and the results of analysis herewith presented are the work of the various district analysts, except in the case of British Columbia. I have, in the case of these samples, entered the percentage number obtained in this laboratory, so as not longer to delay the publication of the Bulletin.

It is interesting to note the fact that a great improvement has taken place since the first samples of this article were examined in 1887. In that year 36 samples were examined, of which 22 (equivalent to 61 per cent) proved to be genuine. The next collection of samples of Cream of Tartar was made in 1889, when 86 samples were analysed (see Bulletin 12) and 52 (equivalent to 60 per cent) were found to be genuine. In 1896 a series of 99 samples was examined, and 65 samples (equivalent to 66 per cent) were found to be genuine. Of the present collection, comprising 65 samples, 57 (equivalent to 88 per cent) are found to be genuine Cream of Tartar. These results are more striking when tabulated, as below:—

Date of Collection.	Total samples.	Genuine.	Genuine, stated as a percentage of the whole.
1887	36	22	61
1889	86	52	60
1896	99	65	66
1900	65	57	88

Although 88 per cent of the samples collected have been classified as *genuine*, it is not to be supposed that these samples are of equal quality among themselves. Chemical purity is not to be expected in a commercial Cream of Tartar. By repeated crystallization of the crude Argols, a separation of lime salts is effected, and the so-called *refined tartar*, or Cream of Tartar may be brought to contain 95 per cent (or even more than this) of bi-tartrate of potassium. The British Pharmacopœia fixes the maximum limit of impurity at 2½ per cent for Potassii Tartras Acidus or *purified* Cream of Tartar.

I suggested in 1889 (Bulletin 12) that commercial Cream of Tartar containing more than 10 per cent of Calcium Tartrate should be considered as *low grade*, and so designated in our reports. I find that 63 per cent of the samples classed as genuine in the accompanying table, will fall into the sub-class *low grade* on the basis of this assumption. Applying this to the samples collected during past years, I find as follows :—

CREAM OF TARTAR.

Date of collection.	Total genuine samples.	Number containing more than 10 p. c. Tartrate of lime.	Same as a percentage on the total number.
1887	22	16	73
1889	52	31	60
1896	65	19	30
1900	57	36	63

It thus appears that while a decided improvement has taken place so far as the genuineness of Cream of Tartar is concerned, the quality or *grade* of that article found upon our markets has not improved during the last decade.

In Bulletin 26 (page 10-11) I have calculated the average percentages of Calcium Tartrate determined by myself in 70 samples of genuine Cream of Tartar, and found 10.66 per cent. It cannot be urged that the high percentage of Calcium Tartrate found in many of these samples is injurious to health, but it is distinctly a loss to the purchaser of the article, since the tartaric acid combined with lime is not available to him ; and it is matter for surprise that refiners do not recover this tartaric acid, thus improving the character of the Cream of Tartar, and realizing—I am induced to think—a handsome margin of profit.

I have the honour to be, sir,

Your obedient servant,

A. McGILL,

Acting Chief Analyst.

RESULTS of the examination of 65

Serial Number.	Sample Number.	Date of collection.	Quantity purchased.	Price.	Name and Address of Vendor.	Available Acidity, c.c. normal.	Bitartrate of Potash.	Free Tartaric Acid.
		1900.		$ cts.	*Halifax, N.S.*	Per 100 grms.	p. c.	p. c.
1	16775	June 5.	3 pkgs.	0 30	N. Cornfoot, Sackville Street	470·	88·36	......
2	16776	" 5.	1 lb ...	0 40	B. J. Hubley, Barrington Street	468·	87·98	....
3	16777	" 5.	1 " ...	0 40	E. W. Crease, Argyle Street	464·8	87·38	....
					Dartmouth, N.S.			
4	16778	" 6.	3 pkgs.	0 40	T. Gentles & Son	461·	86·66	....
5	16779	" 6.	1 lb ...	0 40	G. C. DeWolfe & Son	454·8	85·50	... .
					St. John, N.B.			
6	17711	May 30.	¾ " ...	0 25	Baird & Peters, Ward Street	478·	89·86	....
7	17712	" 30.	1 " ...	0 35	W. A. Porter, 215 Union Street	460·	86·48	....
8	17713	" 31.	1 " ...	0 40	F. E. Williams, cor. Charlotte and Princess Streets.	465·2	87·46	....
9	17714	June 4.	¾ " ...	0 30	Vanwart Bros., cor. Duke and Charlotte Streets.	468·	87·99	....
10	17715	" 5.	1 " ...	0 35	Philips & Watson, Douglas Ave	468·	87·99	....
					Quebec.			
11	19912	" 4.	1 " ...	0 40	A. Rinfret, 414 St. Joseph Street	450·	84·60	....
12	19913	" 4.	1 " ...	0 36	F. Auger, 728 St. Valier Street	460·	86·48	....
13	19915	" 4.	1 " ...	0 40	Kirouac & Frère, 713 St. Valier Street	466·	87·61	....
					Danville, Que.			
14	19916	" 5.	1 " ...	0 40	James Houston	482·	90·62	....
15	19917	" 5.	1 " ...	0 40	Moïse Vigneau	472·	88·74	....
16	19918	" 5.	1 " ...	0 30	A. MacLeay & Riddell Bros	464·	87·23	....
					St. Hyacinthe, Que.			
17	19919	" 18.	1 " ...	0 40	J. B. St. Pierre, 256 Cascade Street	461·	86·67	....
18	19920	" 18.	1 " ...	0 40	Josh. Brodeur, Cascade Street	465·	87·42	.. ....
19	19921	" 18.	1 " ...	0 40	V. Marceau, St. François Street	476·	89·49	.....
20	19922	" 18.	1 " ...	0 40	Gregoire et Frère, 33 Cascade Street	493·	92·68	.. ..
21	19914	" 4.	1 " ...	0 40	A. Ruelland, 6 Bagot Street, Quebec	....	....	....
					Ottawa.			
22	18380	" 7.	¾ " ...	0 27	R. Palmer, 108 Bank Street	462·5	79·64	0·39
23	18381	" 7.	½ " ...	0 20	Industrial Co-operative Association, 234 Bank Street.	456·	85·73	.. ..
24	18382	" 7.	½ " ...	0 20	F. C. Daniels, 270 Bank Street	482·	90·62	....
25	18383	" 7.	½ " ...	0 20	T. Martin, 43 Third Ave	470·	88·36	....
26	18384	" 7.	¾ " ...	0 30	C. Moreland, cor. Bank and Fourth Ave.	525·	98·70	....
27	18385	" 7.	½ " ...	0 20	G. T. Barrett, Ottawa East	467·	87·80	....
28	18386	" 7.	½ " ...	0 20	Mary McDougall, Nicholas Street	474·	89·11	....
					Smith's Falls, Ont.			
29	18387	" 8.	½ " ...	0 20	J. W. Rutherford, grocer	433	81·40	....
30	18389	" 8.	½ " ...	0 20	H. Lyng, grocer	471·	88·55	0·056
					Smith's Falls, Ont.			
31	18390	" 8.	½ " ...	0 20	Jas. Murray	474·	89·11	....
32	18391	" 8.	½ " ...	0 20	Jas. Sutherland	453·	85·16	....

Samples of Cream of Tartar.

Results of Analysis. Calcium Tartrate.	Sulphuric Acid (SO_3).	Phosphoric Acid (P_2O_5)	Calcium Oxide (CaO).	Alumina (Al_2O_3).	Starch.	Serial Number.	Remarks by Analyst.	Analyst.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			
11·93	Traces..	....	2·57	.... ..	....	1	Genuine, but containing excess of calcium tartrate.	M. Bowman, Halifax, N.S.
12·06	" .	....	2·60	.... .	....	2	" " ..	"
12·02	" .	....	2·59	....	... .	3	" " ..	"
12·35	" ..	......	2·66	....	....	4	" " ..	"
14·39	" ..	....	3·10	....	... .	5	" " ..	"
10·16	" ..	... .	2·19	... ...	.. ..	6	" " ..	"
12·11	" ..	....	2·61	......	Trace ..	7	" " .	"
11·74	" ..	....	2·53	....	....	8	" " ..	"
12·07	" ..	....	2·56	... ..	....	9	" " ..	"
11·79	" ..	....	2·54	.... .	....	10	" " .	"
14·56	0·20	....	3·28	....	.. .. ..	11	Genuine	Dr. M. Fiset Quebec.
11·44	0·40	Traces..	2·74	....	....	12	"	"
10·66	..... .	Sl. trace	2·30	.. ..	. ....	13	"	"
8·58	....	....	1·85	... .	....	14	"	"
9·36	. ...	....	2·02	.... ..	.. ....	15	"	"
10·92	.. ..	....	2·35	....	....	16	"	"
12·63	....	....	2·90	. .. ...	....	17	"	"
11·57	Sl. trace	....	2·50	....	....	18	"	"
9·46	... .	....	2·18	. .....	....	19	"	"
6·76	.... ..	....	1·46	....	....	20	"	"
....	....	....	......	....	....	21	This sample, although labelled cream of tartar, consists essentially of boracic acid; adulterated.	"
9·53	2·22	1·9	3·75	0·168	4·17 maize.	22	Adulterated	Dr. F. X. Valade, Ottawa.
12·09	....	....	2·66	....	.. ....	23	Genuine, but of inferior quality.	"
7·28	....	. ..	1·78	....	....	24	Genuine	"
10·79	....	....	2·45	....	....	25	" but of inferior quality.	"
1·28	.. ..	.. .. .	0·30	....	....	26	"	"
11·50	0·158	....	2·79	0·034	....	27	Doubtful	"
9·36	....	... .	2·12	....	....	28	Genuine	"
11·07	3·84	....	5·21	0·008	....	29	Doubtful	"
10·68	....	....	2·31	....	....	30	Genuine, but of inferior quality.	"
9·38	....	....	2·02	... ...	....	31	Unadulterated	Dr. W. H. Ellis, Toronto.
16·11	.... .	....	3·47	....	....	32	Unadulterated, but low grade..	"

RESULTS of the Examination of 65

Serial Number.	Sample Number.	Date of Collection.	Quantity purchased.	Price.	Name and Address of Vendor.	Available Acidity, c.c. normal.	Bitartrate of Potash.	Free Tartaric Acid.
		1900.		$ cts.	*Perth, Ont.*	Per 100 grms.	p. c.	p. c.
33	18292	June 8.	½ lb ...	0 20	W. H. Churchill	498·	93·62	....
					Ottawa.			
34	18393	" 9.	½ " ...	0 20	Baldwin Bros., Nicholas Street	459·	86·29	....
35	18394	" 9.	½ " ...	0 20	C. Elliott, 246 Rideau Street	477·	89·67	....
					Toronto.			
36	18395	" 9.	½ " .	0 20	W. Goddard, Queen W	526·	98·88	....
37	18396	" 9.	½ " ...	0 20	John Hickman, 272 College Street	469·	88 17	....
38	18397	" 9.	½ " ...	0 10	M. E. Godard, 454 King Street W	461·	86·66	....
					St. Catharines.			
39	18398	" 9.	½ " ...	0 20	Moore & Pakman	467·	87·79	....
40	18400	" 9.	½ " ...	0 20	D. L. Cruikshank	469·	88.17	....
					Guelph, Ont.			
41	19352	May 29.	1 " ...	0 40	J. A. McCrea	503	79·71	0·68
42	19353	" 29.	1 " ..	0 40	Scroggie Bros	462·	86·89	....
43	19354	" 29.	1 " ...	0 40	Jackson & Son	223·	29·33	5·02
					Stratford, Ont.			
44	19355	" 30.	1 " ...	0 40	Barnsdale Trading Company	463·	87·06	....
45	19356	" 30.	1 " ...	0 40	C. McIlhargey	447·	84·00	....
					London, Ont.			
46	19357	" 30.	1 " ...	0 40	Jas. Wilson	522·	98·13	....
					Windsor, Ont.			
47	19358	" 31.	1 " ...	0 40	W. J. Cherney	466·	87·57	....
48	19359	" 31.	1 " ...	0 30	John Scott	468·	87·91	....
49	19360	" 31.	1 " ...	0 40	Mason Tea Co	473·	83·10	....
					Winnipeg, Man.			
50	17237	June 18.	1 " ...	0 40	J. Coltart	483·8	90·96	....
51	17238	" 18.	1 " ...	0 40	F. Rosenblat	....	....	....
52	17238	" 18.	1 " ...	0 50	Wm. Magee	481·0	90·43	....
53	17240	" 18.	1 " ...	0 40	W. H. Morgan	476·2	89·52	....
54	17241	" 19.	1 " ...	0 40	The Hudson Bay Co., Lower Fort Garry	451·3	94·25	....
					Selkirk, Man.			
55	17242	" 19.	1 " ...	0 40	Woodlinger & Finkelman	471·2	88·58	....
56	17243	" 19.	1 " ...	0 35	Wm. Epstein	336·	48·95	....
57	17244	" 19	1 " ...	0 50	Rosen & Duggan	507·1	95·33	....

Samples of Cream of Tartar—*Continued.*

Results of Analysis.								
Calcium Tartrate.	Sulphuric Acid (SO_3).	Phosphoric Acid (P_2O_5)	Calcium Oxide (CaO).	Alumina (Al_2O_3).	Starch.	Serial Number.	Remarks by Analyst.	Analyst.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			
7·27	....	....	3·00	....	....	33	Unadulterated	Dr. W. H. Ellis, Toronto.
13·23	....	....	2·85	....	....	34	Unadulterated, but low grade..	"
9·38	....	....	2·02	....	....	35	Unadulterated	"
....	....	....	...	....	....	36	Unadulterated and pure.......	"
11·84	....	....	2·55	....	....	37	Unadulterated, but low grade..	"
11·84	....	....	2·55	....	....	38	" "	"
12·33	....	....	2·65	....	....	39	" "	"
11·60	....	....	2·50	....	....	40	" "	"
0·13	9·70	....	4·55	1·19	Trace... (corn)	41	Adulterated with tartaric acid, alum and gypsum.	Mr. F. T. Harrison, London, O.
9·62	1·30	....	3·20	....	....	42	Low grade. Very much below B.P. standard.	"
3·12	28·72	....	20·90	....	....	43	Adulterated with tartaric acid and over 60 p.c. of gypsum.	"
9.23	1·26	....	3·10	....	....	44	Low grade. Very much below B.P. standard.	"
14·56	0·16	....	3·50	....	....	45	" " ..	"
0.91	Trace...	....	0.21	....	....	46	Pure.....................	"
9·23	0·94	....	2·83	....	....	47	Low grade. Very much below B.P. standard.	"
10·40	0·22	....	2·47	....	....	48	" " ..	"
11·31	1·70	Trace...	2·70	0·54	Trace... (Corn)	49	Adulterated.	"
8·07	....	....	1·74	....	....	50	Genuine	Prof. E. B. Kenrick, Winnipeg.
....	8·67	4·78	3·65	3·35	55·04 (Corn)	51	Adulterated. This sample is an alum phosphate baking powder and does not contain any cream of tartar.	"
10·28	....	....	2·20	....	....	52	Genuine	"
9·90	....	....	2·13	....	....	53	"	"
5·83	....	....	1·25	....	....	54	"	"
10·85	....	....	2·34	....	....	55	"	"
....	6·48	14·80	12·13	....	9·32 (Corn)	56	Adulterated to the extent of about 50 p.c. with starch and phosphate of lime.	"
5·07	....	....	1·09	....	....	57	Genuine	

RESULTS of the examination of 65

Serial Number.	Sample Number.	Date of Collection.	Quantity Purchased.	Price.	Name and Address of Vendor.	Available Acidity, c.c. normal.	Bitartrate of Potash.	Free Tartaric Acid.
		1900.		$ cts.	*Vancouver, B.C.*	Per 100 grms.	p. c.	p. c.
58	20177	June 13.	1 lb	0 50	Welsh & Nightingale	478·	89·9	....
59	20178	" 13.	1 "	0 35	Geo. Wagg	476·	89·5	....
60	20180	" 13.	1 "	0 40	Vanir Grocery Company	472·	88·7	....
61	20181	13.	1 "	0 35	LaBelle & Co	454·	85·4	....
					Victoria, B.C.			
62	20188	15.	1 "	0 40	F. Came, jr	528·	99·3	....
63	20189	" 15.	1 "	0 50	Mowat & Wallace	464·	87·2	....
64	20190	" 15.	1 "	0 40	Hardress Clarke	506·	95·1	....
65	20191	" 15.	1	0 40	L. Dickson	438·	82·3	....

Samples of Cream of Tartar—*Concluded.*

Results of Analysis.						Serial Number.	Remarks by Analyst.	Analyst.
Calcium Tartrate.	Sulphuric Acid (SO_3).	Phosphoric Acid (P_2O_5)	Calcium Oxide (CaO).	Alumina (Al_2O_3).	Starch.			
p. c.	p. c.	p. c.	p. c.	p. c.				
5·20	....	....	2·74	....	....	58	Genuine	A. McGill, Ottawa.
4·16	1·545	....	......	....	....	59	Genuine, but not highly refined and containing about 5 p.c. sulphate of lime.	"
18·20	.. ..	.. ..	2·99	... .	....	60	Genuine, but not highly refined.	"
15·08	... ..	. . ..	3·70	....	... ...	61	" ..	"
2·6	....	.. ...	0·48	.... .	.. ..	62	Refined cream tartar of extra quality.	"
13·78	....	....	3·15	....	. . ...	63	Genuine, but not highly refined.	"
5·72	....	....	1·43	....	....	64	Genuine	"
16·64	... .	....	5·23	....	.. ....	65	Genuine, but not highly refined.	"

APPENDIX O.

BULLETIN No. 72.—COCOA AND CHOCOLATE.

LABORATORY OF THE INLAND REVENUE DEPARTMENT.

OTTAWA, September 15, 1900.

E. MIALL, Esq.,

Commissioner of Inland Revenue.

SIR,—I have the honour to present to you a report upon sixty-six samples of Cocoas and Chocolates which were collected throughout the Dominion in February of the present year. The work has been done by the various district analysts whose names are given in Table I, and in this laboratory. The work done in this laboratory has had special reference to an investigation of the value of the extraction method as applied to cocoas, with a view to determining the composition of the article in other respects than as to its content in fat and sugar. For the purpose of more intelligently presenting this work I have introduced Tables IV and V.

This work must be considered as a contribution to the study of methods, rather than as a completed investigation. Press of other work has prevented its being carried further, but I hope that opportunity may be given for its fuller exploitation, when next the subject of cocoa is taken up, since I think more can be made of it than is indicated here.

The samples examined comprise 27 plain (non-sugared) cocoas, and 39 sugared cocoas, or chocolates. Of the plain cocoas only three samples contain the whole of the fat normally present in the cocoa bean. The remaining 24 samples have been treated in such a way as to remove from one-fifth to about two-thirds of this fat. Since the fat of the Cocoa bean (cocoa-butter) has a high value in pharmacy, there is a great temptation to remove it from the beans before employing these in the manufacture of commercial cocoas. At the same time, it is claimed that cocoa from which a portion of the fat has been removed is a much preferable article to the normal substance, giving a more palatable solution and being more easily digested. This may be quite true, but it is certain that the removal of the fat deprives the cocoa of much of its value as a nourishing food ; and the purchaser has a right to know to what extent the manufacturer has carried the removal.

Since the total aqueous extractive matter of cocoa is only about 20 to 25 per cent of its weight, a very large insoluble deposit tends to form in the cup. To prevent this subsidence manufacturers have resorted to the addition of a small proportion of starch, which gelatinizes on adding boiling water, and serves to keep the insoluble cocoa in suspension. A preferable method is to reduce the cocoa tissue, by grinding, to a very fine powder, and most of the samples now reported, shew that this precaution has been taken in preparing them.

It has been asserted that sometimes the whole of the normal fat of cocoa has been removed, prior to its being prepared for the market, and a cheaper fat substituted for the cocoa-butter in the course of manufacture. I have not found any samples in which such a substitution has certainly been made ; but the low iodine absorption number obtained in samples 23, 36 and 37 tends to make them suspicious in this regard.

Nothing of an unwholesome nature has been found in any sample.

Finally, I beg to recommend that this report be published as Bulletin 72 of the series issued from this laboratory.

I have the honour to be, sir,

Your obedient servant,

A. McGILL.

Acting Chief Analyst.

TABLE I.

Serial Numbers.	Departmental Numbers	Date of Collection.	Quantity purchased.	Price.	Name of Vendor.	Residence.	Analyst to whom sent.
		1900.		$ cts.			
1	17228a	Feb. 14	3 tins	0 35	Wright & Co.	Minnedosa	Prof. E. B. Kenrick.
2	17228b						
3	19331a	" 1	3 packages	0 30	James Wilson	398 Richmond, London, Ont.	Mr. F. T. Harrison.
4	19331b						
5	19662a	" 5	3 tins	0 39	Wm. Davis	Main St., Richmond, Que.	Dr. M. Fiset.
6	19662b						
7	20657a	" 3	2 tins	0 26	W. Madden	141 Queen St., Ottawa	Dr. F. X. Valade.
8	20657b						
9	20669a	" 9	3 tins (¾ lb.)	0 30	M. McAuliffe	Perth, Ont.	Dr. W. H. Ellis.
10	20669b						
11	17229a	" 14	3 cakes	0 25	W. A. B. Hassell	Minnedosa	Prof. E. B. Kenrick.
12	17229b						
13	19670a	" 5	1 lb.	0 30	Elz. Turcotte	74 Defossés, Quebec	Dr. M. Fiset.
14	19670b						
15	20660	" 5	3 cakes (¾ lb.)	0 30	A. Sibbeth & Son	Carleton Place	Dr. F. X. Valade.
16	19668a	" 5	3 tins	0 30	Chabot & Drolet	271 St. Joseph, Quebec	Dr. M. Fiset.
17	19668b						
18	17233a	" 14	1 lb	0 40	Wm. Howatt	Neepawa	Prof. E. B. Kenrick.
19	17233b						
20	17234a	" 14	3 tins	0 10	A. J. Calhoun	"	"
21	17234b						
22	19665a	" 5	3 packages	0 30	Jean P. Guy	152 St. Paul, Quebec	Dr. M. Fiset.
23	19665b						
24	20658	" 3	" (¾ lb.)	0 15	W. Madden	141 Queen St., Ottawa	Dr. F. X. Valade.
25	17232a	" 14	3 cakes	0 60	Wm. Howatt	Neepawa	Prof. E. B. Kenrick.
26	17232b						
27	19330a	" 1	3 packages (¾ lb.)	0 30	James Mills	Norwich, Ont.	Mr. F. T. Harrison.
28	19330b						
29	19332	" 1	" "	0 38	John Lawson	261 Dundas St., London, Ont.	"
30	19667a	" 5	1 lb	0 40	Chabot & Drolet	271 St. Joseph, Quebec	Dr. M. Fiset.
31	19667b						
32	20665a	" 10	3 cakes	0 36	Hunter's Grocery	Peterborough	Dr. W. H. Ellis.
33	20665b						
34	20670a	" 10	"	0 15	G. Robinson	Toronto	"
35	20670b						
36	19666a	" 5	1 lb.	0 25	Jean P. Guy	152 St. Paul, Quebec	Dr. M. Fiset.
37	19666b						

38	19327a	Jan.	21	"	0 25	George Hasenflug	Waterloo, Ont.	Mr. F. T. Harrison.
39	19327b							
40	17230	Feb.	14	3 tins	1 00	T. J. McDermot	Minnedosa	Prof. E. B. Kenrick.
41	19669a	"	5	"	0 90	Elz. Turcotte	74 Defossés, Quebec	Dr. M. Fiset.
42	19669b							
43	20664	"	9	" (¾ lb.)	0 75	MacKerracher	Perth, Ont.	Dr. W. H. Ellis.
44	19329a	"	1	3 packages (¾ lb.)	0 30	S. Pitcher	Norwich, Ont.	Mr. F. T. Harrison.
45	19329b							
46	20663a	"	9	3 tins (¾ lb.)	0 36	T. A. Moore	Perth, Ont.	Dr. W. H. Ellis.
47	20663b							
48	20661a	"	5	"	0 60	A. Sibbeth & Son	Carleton Place	Dr. F. X. Valade.
49	20661b							
50	20666a	"	10	2 tins (1 lb.)	0 60	P. Robinson	Peterborough	Dr. W. H. Ellis.
51	20666b							
52	19663a	"	5	1 lb.	0 50	Wm. Davis	Main St., Richmond, Que.	Dr. M. Fiset.
53	19663b							
54	20667a	"	10	3 tins (1 lb.)	0 75	J. C. Sullivan.	Peterborough	Dr. W. H. Ellis.
55	20667b							
56	20656a	"	3	2 tins (¾ lb.)	0 25	A. E. Cowan	Sparks St., Ottawa.	Dr. F. X. Valade.
57	20656b							
58	20668a	"	10	" (1 lb.)	0 60	Hargreaves Bros.	Toronto	Dr. W. H. Ellis.
59	20668b							
60	19664	"	5	3 tins	0 75	H. P. Wales	Richmond, Que.	Dr. M. Fiset.
61	20662a	"	5	" (¾ lb.)	0 30	Weekes Bros.	Carleton Place	Dr. F. X. Valade.
62	20662b							
63	19328	Jan.	31	3 packages (¾ lb.)	0 25	George Hasenflug	Waterloo, Ont	Mr. F. T. Harrison.
64	17235	Feb.	19	3 cakes	0 75	A. F. Calder	Neepawa	Prof. E. B. Kenrick.
65	20659a	"	5	½ lb.	0 15	Cochran & Castle	Ottawa	Dr. F. X. Valade.
66	20659b							

TABLE II.—Non-Sugared Cocoas.

Serial Number.	Departmental Number.	Moisture.	Fat.			Ash.			Phosphoric Acid. P_2O_5.	Remarks.	Name of Brand.
			p. c.	Iodine Number.	KOH	Total.	Insol.	Sand.			
		p. c.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
40	17230	3·95	28·61	34·3	..	7·84	....	....	....	Refractive index of fat—D at 23 C. = 1·46306 cocoa, from which nearly half the normal fat has been removed.	Van Houten's Cocoa.
41	19669a	4·38	28·63	35·0	19·7	8·15	1·65	0·05	....		
42	19669b	5·20	27·28	33·7	18·2	8·20	1·88	0·05	....		
43	20664	2·65	29·35	30·8	....	8·20	1·85	0·05	1·43		
	Means	4·04	28·46	33·4	19·0	8·10	1·78	0·05	1·43		
44	19329a	5·17	17·38	38·5	19·6	6·80	3·89	0·35	1·33	Cocoa, from which about two-thirds of the fat has been removed.	Webb's Cocoa.
45	19329b	5·76	17·78	....	20·2	....	....	....	....		
46	20663a	5·01	18·25	35·1	....	6·30	3·46	0·30	....		
47	20663b	4·83	17·36	....	....	6·45	3·40	0·35	....		
48	20661a	3·95	19·72	36·0	18·4	6·87	4·54	0·94	....		
49	2.661b	4·03	19·18	....	19·2	6·80	3·99	0·55	1·37		
	Means	4·79	18·27	36·5	19·3	6·64	3·86	0·50	1·35		
50	20666a	3·15	27·14	32·8	19·2	5·00	3·50	0·10	1·37	Cocoa, from which nearly half the normal fat has been removed.	Baker's Breakfast Cocoa.
51	20666b	4·17	27·80	....	19·8	4·95	3·50	0·11	....		
	Means	3·66	27·47	32·8	19·5	4·97	3·50	0·10	1·37		
52	19663a	1·87	53·25	35·1	19·2	2·85	1·27	0·05	....	Normal cocoa.	Baker's Chocolate.
53	19663b	2·43	54·20	34·0	20·0	2·90	1·32	0·07	....		
	Means	2·15	53·72	34·5	19·6	2·87	1·29	0·06	....		
54	20667a	5·11	30·39	29·2	....	6·90	2·45	0·10	....	Cocoa, from which less than half the normal fat has been separated. Contains no foreign starch.	Bensdorp's Cocoa.
55	20667b	5·20	31·34	....	....	6·75	2·05	0·10	....		
56	20656a	6·34	30·99	32·8	19·2	6·75	1·89	0·06	....		
57	20656b	5·22	30·87	34·0	20·1	6·80	1·95	0·05	....		
	Means	5·54	30·90	32·0	19·7	6·80	2·08	0·08	....		

58	20668*a*	3·29	36·10	33·6	....	4·65	3·05	0·40	....	Cocoa, from which about one-third the normal fat has been separated.	Huyler's Cocoa.
59	20668*b*	3·85	36·79	....	....	4·60	3·00	0·42	....		
	Means	3·57	36·45	33·6	....	4·62	3·02	0·41	....		
60	19664	7·00	30·51	34·3	19·5	4·87	1·47	0·05	....	Cocoa, from which about one-third the normal fat has been removed.	Cowan's Cocoa.
61	20662*a*	6·21	33·92	33·3	18·9	4·55	1·05	0·06	....		
62	20662*b*	5·35	35·67	....	....	4·55	1·00	0·05	....		
63	19328	5·61	33·32	35·0	19·9	4·48	1·30	0·10	1·130		
	Means	6·04	33·20	34·2	19·4	4·61	1·20	0·06	1·130		
64	17235	2·53	55·93	34·9	....	2·67	....	....	....	Contains a trace wheat starch; otherwise normal.	Lion Brand Cocoa.
65	20659*a*	3·08	43·41	33·8	19·6	2·83	1·42	0·03	....	Appear to have had a portion (one-fifth) of the normal fat separated.	Cocoa nibs.
66	20659*b*	3·63	44·62	....	....	2·85	1·45	0·03	....		
	Means	3·35	44·02	33·8	19·6	2·84	1·43	0·03	....		

NOTE.—The high percentage of ash found in certain of the above samples is probably due to the use of a fixed alkali in the preparation of the cocoa. The Holland cocoas are generally prepared in this way, and it is claimed that the treatment renders them more digestible. This claim has, however, been disallowed by several scientists, and the question may be said to be, as yet, an unsettled one.

TABLE III.—SUGARED COCOAS.

Serial Number.	Departmental Number.	Moisture.	Sugar. Reducing.	Sugar. Cane.	Fat. p. c.	Fat. Iodine Number	Fat. KOH.	Ash. Total.	Ash. Insol.	Ash. Sand.	Phosphoric Acid, P_2O_5.	Remarks.	Name of Brand.
		p. c.	p. c.	p. c.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1	17228a	5·48	R.	25·87	25·83	34·6		1·51				Contains arrowroot starch. Refractive index of fat—D at 23°c. =1·46330.	Epps' Cocoa.
2	17228b	4·43	1·05	24·63	26·85								
3	19331a	4·70	None.	27·60	25·64	34·8	19·7	1·50	0·85	0·08	0·47		
4	19331b	4·73	1·17	27·01	25·99								
5	19662a	4·21	None.	28·31	27·50	34·1	19·3	1·50	0·55	0·03			
6	19662b	4·21	0·89	26·12	27·02	34·0		1·45	0·65	0·05			
7	20657a	3·97	1·07	24·22	26·44	33·7	19·4	1·41	0·75	0·03			
8	20657b	4·30	1·25	26·76	26·77	34·0		1·45	0·55	0·03			
9	20669a	4·41	None.	28·12	27·85	32·5		1·45	0·95	0·05			
10	20669b	3·88	2·54	21·33	27·03			1·45	0·90	0·05			
	Means	4·43	1·33	26·00	26·69	34·0	19·5	1·47	0·74	0·05	0·47		
11	17229a	2·07	R.	53·58	19·32	37·1		0·86				Contains some wheat starch	Fry's Diamond Chocolate.
12	17229b	2·74	1·84	51·60	17·92								
13	19670a	1·93	0·87	51·27	18·30			0·80	0·35	0·01			
14	19670b	2·30	0·88	55·51	18·68	33·3		0·81	0·54	0·06			
15	20660	2·64	0·88	49·65	20·92	34·8	19·1	0·81	0·54	0·06			
	Means	2·34	1·12	52·91	19·03	35·1	19·1	0·82	0·48	0·04			
16	19668a	3·62	None.	38·76	15·13	33·3	19·9	1·87	0·75	0·02			Fry's Homeopathic Cocoa.
17	19668b	3·79	1·19	39·55	14·80	35·0		1·90	0·80	0·03			
	Means	3·70	1·19	39·16	14·97	34·2	19·9	1·88	0·77	0·02			
18	17233a	5·04	R.	28·61	9·65	36·6		2·48				Contains wheat starch	Galt's Blue Ribbon Cocoa.
19	17233b	5·56	2·10	30·59	9·28								
20	17234a	5·46	R.	32·80	12·39	34·9		1·84					
21	17234b	5·23	3·12	28·18	11·74								
	Means	5·32	2·61	30·04	10·77	35·7		2·16					

22	19665a	3·91	1·45	47·00	13·18	......	18·3	2·30	0·63	0·02	......	......	Cowan's "London Pearl Cocoa.
23	19665b	3·83	1·07	51·44	12·72	26·8	.....	2·30	0·65	0·02	......		
	Means	3·87	1·26	49·22	12·95	26·8	18·3	2·30	0·64	0·02	......		
24	20658	0·78	1·20	46·28	23·20	33·8	19·0	1·17	0·58	0·06	......	......	Cowan's Diamond Chocolate
25	17232a	2·85	R.	26·26	31·88	35·3	.....	2·62	.....	.....	......	A little wheat starch	Mott's Chocolate Compound
26	17232b	1·47	2·53	60·97	21·16	......	.....	.....	.....	.....	......	......	Mott's Diamond Chocolate.
27	19330a	1·04	None.	62·00	20·83	32·0	20·0	1·12	0·65	0·08	0·33		
28	19330b	1·46	1·71	61·69	21·29	......	.....	.....	.....	.....	......		
	Means	1·32	1·41	61·55	21·09	32·0	20·0	1·12	0·65	0·08	0·33		
29	19332	1·44	None.	61·20	20·10	34·8	19·8	1·44	0·98	0·08	0·57	......	Chocolat Menier.
30	19667a	0·83	2·08	58·50	20·90	34·4	19·3	1·50	0·65	0·02	......		
31	19667b	1·51	1·93	58·47	20·45	34·2	18·9	1·45	0·60	0·02	......		
	Means	1·26	2·00	59·72	20·48	34·5	19·3	1·46	0·74	0·04	0·57		
32	20665a	1·37	None.	56·12	27·08	31·3	18·9	1·30	0·85	0·05	0·46	......	Cadbury's Chocolate.
33	20665b	1·34	2·01	55·15	26·49	......	.....	1·30	0·80	0·05	......		
	Means	1·35	2·01	55·63	26·78	31·3	18·9	1·30	0·82	0·05	0·46		
34	20670a	1·58	None.	63·75	23·80	32·3	.....	1·10	0·75	0·07	......	......	Baker's German Chocolate.
35	20670b	1·37	3·07	56·64	23·00	......	19·0	1·15	0·75	0·06	......		
	Means	1·47	3·07	60·20	23·40	32·3	19·0	1·12	0·75	0·06	......		
36	19666a	5·20	Trace.	26·00	23·15	20·1	20·6	1·80	0·90	0·10	......	Iodine number for fat is too low, and points to the presence of foreign fat.	Thomas' Chocolate.
37	19666b	5·43	"	21·30	23·38	25·7	15·2	1·85	0·90	0·99	......		
	Means	5·31	Trace.	23·65	23·26	22·9	17·9	1·82	0·90	0·09	......		
38	19327a	3·11	None.	41·80	17·08	35·8	19·8	1·64	0·41	0·05	0·308	Contains some maize starch	Bulk Cocoa.
39	19327b	4·59	4·93	36·53	18·30	......	.....	.....	.....	.....	......		
	Means	3·85	2·56	39·17	17·69	35·8	19·8	1·64	0·41	0·05	0·308		

TABLE IV.

A study of the water extractive of Cocoas. The samples were first dried and freed from fat.

Sugared Cocoas.

Serial Number.	Extraction by Water at 80 C. 1st 500cc.	2nd 500cc.	Total Extractive.	Total Sugar. See Table III.	Excess = Non-sugar Extractive.	Non-sugar Extractive as percentage on Dry Fat and Sugar free Substance.	Remarks.
2	30·22	1·84	32·06	25·68	6·38	14·9	
4	33·47	3·07	36·51	28·18	8·33	20·2	
6	31·97	2·29	34·26	27·01	7·25	17·4	Epps' Cocoa: Arrowroot starch is present in considerable amount.
8	32·64	3·54	36·18	28·01	8·17	20·0	
10	32·77	2·22	34·99	23·87	11·12	24·6	
12	57·06	0·60	57·66	53·44	4·22	16·3	Fry's Diamond Chocolate: Contains some wheat starch.
14	57·45	1·16	58·61	56·42	2·19	9·8	The extraction is apparently incomplete in 14.
17	43·64	1·72	45·36	40·74	4·62	11·4	Blue Ribbon Cocoa: Contains wheat starch.
19	39·40	2·04	41·41	32·69	8·75	16·9	
21	39·30	3·51	42·81	31·30	11·51	22·2	
23	57·71	1·75	59·46	52·51	6·95	22·4	
26	66·40	0·70	67·10	63·50	3·60	25·9	
28	66·62	0·65	67·27	63·40	3·87	27·9	
31	65·73	1·10	66·83	60·40	6·43	36·4	Chocolat Menier: Contains no added starch.
33	58·84	1·05	59·89	57·16	2·73	18·2	Extraction apparently incomplete. See Table V.
35	64·02	0·91	64·93	59·71	5·22	32·8	Bakers' German Chocolate: Contains no added starch.
37	25·72	2·37	28·09	21·30	6·79	13·6	
39	46·70	0·89	47·59	41·46	6·13	17·2	Contains maize starch.

Non-Sugared Cocoas.

Serial Number.	1st 500cc.	2nd 500cc.	Total Extractive.	Total Sugar.	Excess = Non-sugar Extractive.	Non-sugar Extractive as percentage on Dry Fat and Sugar free Substance.
42	18·77	5·10	23·87	......	......	35·3
45	20·78	6·14	26·92	......	......	35·2
47	16·23	10·63	26·86	......	......	34·5
49	20·30	4·58	24·88	......	......	32·4
51	19·28	4·56	23·84	......	......	35·0
53	13·30	2·52	15·82	......	......	36·3
55	17·93	4·43	22·36	......	......	35·2
57	16·09	4·39	20·48	......	......	32·0
59	15·69	3·70	19·39	......	......	32·6
62	18·85	3·60	22·45	......	......	37·6
66	13·72	3·59	17·31	......	......	33·4
					Mean...	34·5

Remarks: None of these samples contain foreign starch. If we assume that the smaller non-sugar extractive, as calculated to a percentage on the dry fat and sugar free substance, obtained with the samples tabulated above, is due to the presence of starch or other ingredient, yielding nothing to water, the percentage of such ingredient present may be approximated by the formula, $x = 34.5 - a$, where x = percentage of ingredient, and a = percentage of extractive found, and calculated as above.

On this assumption, Nos. 31 and 35 are the only sugar-containing cocoas which are quite free from added starch, and the amount present in other samples varies from about 5 to more than 20 per cent.

TABLE V.

A study of Alcohol extraction, followed by Water extraction, on dry and fat free Cocoas.

SUGARED COCOAS.

Serial Number	Extractive by Alcohol. — S. g. 0·815.	Subsequent Extraction by 500cc. Water at 80° C.	Sum.	Difference between Alcohol Extractive and total Sugar. (See Table IV.)	Difference between Alcohol and Water Extraction, and Water Extractive. (See Table IV.)	Remarks.
	p. c.	p. c.	p. c.	p. c.	p. c.	
2	27·69	4·49	32·18	2·01 excess	0·12 excess	The treatment with alcohol removes a little more (in four cases a little less, mean=1·31 p.c.) than the sugar, the mean excess being 1·58 p.c. The total extractive is a little less (in three cases a little more, mean=0·43) than that by the double water treatment, the mean deficiency being 1·20 p.c.
4	29·25	5·75	35·00	1·07 ″	1·51 deficiency	
6	27·95	4·94	32·89	0·94 ″	1·37 ″	
8	28·21	4·88	33·09	0·20 ″	3·09 ″	
10	28·07	5·57	33·64	4·20 ″	1·35 ″	
12	54·32	2·75	57·07	0·88 ″	0·59 ″	In view of the large extractive by alcohol in non-sugared cocoas (*vide infra*), the fact of sugar only being extracted in this series, by alcohol, is surprising. There can be little doubt that a longer continuation of the alcohol treatment would have taken soluble matter other than sugar.
14	55·52	3·37	58·89	0·90 deficiency	0·28 excess	
17	39·83	5·16	44·99	0·91 ″	0·37 deficiency	
19	34·25	6·58	40·83	1·56 excess	0·61 ″	
21	36·40	3·43	39·83	5·10 ″	2·98 ″	
23	50·19	6·53	56·72	2·32 deficiency	2·74 ″	
26	64·34	2·65	67·99	0·84 excess	0·89 excess	
28	63·89	2·79	66·68	0·49 ″	0·59 deficiency	
31	63·02	3·24	66·26	2·62 ″	0·57 ″	
33	56·06	3·18	59·24	1·10 deficiency	0·65 ″	
35	60·67	3·41	64·08	0·96 excess	0·85 ″	
37	22·50	4·83	27·33	1·20 ″	0·76 ″	
39	42·54	5·02	47·56	1·08 ″	0·03 ″	

NON-SUGARED COCOAS.

Serial Number	Extractive by Alcohol. — S. g. 0·815.	Subsequent Extraction by 500cc. Water at 80° C.	Sum.	Difference between Alcohol Extractive and total Sugar. (See Table IV.)	Difference between Alcohol and Water Extraction, and Water Extractive. (See Table IV.)	Remarks.
42	9·05	13·93	22·98	....	0·89 deficiency	Two treatments with water (as in Table IV) secure a more complete extraction of dry cocoa tissue than a treatment with alcohol followed by one with water, but the difference is not great, and three samples appear to be exceptions to this generalization. The average excess given by alcohol-water treatment in these cases is 1·35 p.c., whereas the average excess given by the double-water treatment in the remaining eight cases is 2·39 p.c.
45	10·75	10·25	21·00	....	5·92 ″	
47	10·54	14·18	24·72	....	2·14 ″	
49	13·04	13·13	26·17	....	1·29 excess	
51	12·28	8·32	20·60	....	3·24 deficiency	
53	7·36	7·16	14·52	....	1·32 ″	
55	8·95	12·74	21·69	....	0·67 ″	
57	9·37	12·27	21·64	....	1·16 excess	
59	9·26	8·37	17·63	....	1·76 deficiency	
62	9·38	9·90	19·28	....	3·17 ″	
66	11·26	7·66	18·92	....	1·61 excess	

TABLE VI.

Reducing substances (to Fehling) present in non-sugared Cocoas, expressed as Dextrose.

Serial Number.	Apparent Dextrose.	Apparent Dextrose after Acid Treatment.	Increase by Acid Treatment.	Remarks.
42	1·55	3·06	1·51	The substances, present in normal cocoas, which reduce Fehling's solution, calculate to about 2 per cent as dextrose, and their presence will produce a certain error in the estimation of reducing sugar in cocoa. Where cane sugar is present as a diluent to about 50 per cent, this error calculated upon the whole sample, will amount to about 1 per cent; and it is probable that the numbers appearing in the column head "reducing sugar" in Table III. are about this much in excess of the truth. It is probable that no reducing sugar has been purposely added to any of these samples, the small amounts found being sufficiently accounted for by traces of invert sugar produced from the cane sugar used. The mean dextrose indicated in the sugared cocoas examined is 1·46 per cent; and since the mean cane sugar present is 50 per cent, the reducing sugar calculated upon the cocoa tissues present, will be about 2 × 1·46 = 2·92 per cent. It appears, therefore, that not more than about 1 per cent of reducing sugar is actually present in these cocoas.
45	2·16	...	...	
48	3·61	...	...	
49	2·90	...	...	
51	3·31	...	...	
52	2·08	...	...	
53	1·15	...	...	
55	2·04	...	...	
56	0·28	1·41	1·13	
57	1·51	2·19	0·68	
59	2·16	...	...	
60	2·91	0·93	0·36	
61	0·63	...	...	
62	3·22	...	...	
65	2·39	...	...	
66	2·79	...	...	
Mean...	2·04	...	0·90	

APPENDIX P.

BULLETIN No. 73.—CLOVES.

LABORATORY OF THE INLAND REVENUE DEPARTMENT.
OTTAWA, October 19, 1900.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—On July 21, 1899, the High Commissioner for Canada addressed a letter to the Honourable the Minister of Inland Revenue calling his attention to representations which had been made, in a letter to Lord Strathcona, by a firm of wholesale grocers of the highest repute in London regarding the inferior and adulterated quality of the spices allowed to be sold in the Dominion. Attention was particularly directed to samples of so called cloves, which consisted mainly of the exhausted article, that is of clove stalks and stems, without the flower buds, which constitute the most valuable part of the spice. Both of these varieties of samples were said to have a certain amount of genuine or whole cloves mixed with them, but it was asserted that, nevertheless, the mixtures were such as would be condemned under the adulteration laws of Great Britain. The firm in question appealed to Lord Strathcona to give his powerful assistance towards causing an investigation to be made into the way in which the adulteration laws of Canada are enforced, especially in the case of spices, and assured him that, under the existing state of things, no respectable merchant in Great Britain could compete in endeavouring to secure orders from Canada.

In consequence of these representations, and in accordance with your permission, 19 samples of whole and 22 samples of ground cloves were collected in the Maritime Provinces and in the provinces of Quebec and Manitoba in September, 1899, and submitted to the various district analysts for examination. Of these, 15 samples of ground cloves and 3 samples of whole cloves were found to be adulterated or deficient in volatile oil, and proceedings were taken against several of the vendors of the samples which were reported as containing less than 12 p.c. Subsequently it was found that investigation was necessary both with reference to a standard, as regards the proper quantity of volatile oil which genuine cloves ought to contain and also as to the methods of analysis to which the various samples should be subjected.

This investigation has been carried out in the most thorough manner by my assistant Mr. A. McGill, B.A., and his results are contained in the note on cloves dated July 3, and a report on the 18th inst., both of which are subjoined hereto. I beg to recommend their publication, as well as that of the present report, in order that the subject may be better understood by the trade and the public, and in order also that, when you cause another collection of clove samples to be made, the district analysts may use in their examinations, if so minded, Mr. McGill's very excellent suggestions.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

NOTE ON CLOVES.

Cloves (clous de girofle) are the flower buds of Eugenia Caryophyllata, a tree which is indigenous to the Moluccas, but which has been introduced into Zanzibar, Cayenne, and elsewhere. Cloves are known in commerce as East Indian, African or American, and their market value decreases in this order.

The value of the clove is due to the volatile, or so-called essential oil which it countains, and the accurate determination of this volatile oil is the most important means of ascertaining the quality of a given sample of cloves. Besides the volatile oil, the determination of fixed oil, moisture, ash and carbohydrates, afford useful data for the valuation of this spice.

The only published analyses of cloves which have come under my notice are those of Clifford Richardson of Washington, contained in Bulletin 13 of the Department of Agriculture, Part II, p. 225, issued in 1887. These analyses have been copied by König (Nahrungs und Genussmittel, p. 744), with the addition of that of a single sample supplied by a druggist of Münster, and again by V. Gerin (Encyclopédie Chimique, Tome X, p. 657). So far as these analyses deal with whole cloves, presumably genuine, they show the following results:—

Description of the Sample.	Volatile Matter.			Fixed oil.	Total extraction.	Ash.
	Water.	Volatile oil.	Total.			
Guaranteed cloves purchased from Washington Grocers.	6·95	16·35	23·30	7·12	30·42	5·99
Whole cloves purchased from druggists, Washington......	3·98	16·61	20·59	9·72	30·31	9·31
do do	5·96	10·23	16·19	9·94	26·13	7·66
do do ...	2·90	15·87	18·77	10·07	28·84	13·05
Extra quality cloves..........	8·67	17 94	16 61	9·54	36·15	7·72
Amboyna cloves........	8·78	18·89	27 67	10·24	37·91	5·25
Singapore cloves	10·67	13·52	24·19	9·95	34·14	5·50
Means...	6 84	15·63	22·48	9·51	31·99	7·78

From this it appears that *moisture* in cloves may vary from 2·90 per cent to 10·67 per cent; the volatile oil from 10·23 per cent to 18·89 per cent; the fixed oil from 7·12 per cent to 10·24 per cent. and the ash from 5·25 per cent to 13·05 per cent. The Münster sample quoted by König must have been altogether abnormal as it contained 16·39 per cent of water. Flückiger (quoted by C. Richardson) states that the volatile oil varies from 16 to 20 per cent. Dietsch gives the following as the percentage of oil (volatile ?) to be expected in cloves from different sources:—

Amboyna	16 to 21	per cent.
Zanzibar........................	12 to 17	"
Cayenne.........................	9 to 12	"

Owing to the difficulty of exactly determining the moisture as distinct from the volatile oil, I prefer to rely upon the sum of these two percentage numbers; and have introduced into the following table a number under the heading *total volatile matter*. In order to check any excess of moisture, which might be added fraudulently, I dry the sample, to constant weight, at the ordinary temperature, over strong sulphuric acid.

The number so obtained I have not found to exceed 5·85 per cent, and I am forced to believe that much of the so-called *water* found in analytical results includes more or less volatile oil. The number for total volatile matter found by Richardson, varies from 16·19 to 27·67 per cent, and averages 22·48 per cent.

The principal adulteration of cloves results from one or other of the following :—

1. Extraction of the whole or part of the volatile oil.
2. Introduction of stems.
3. Addition of cheaper spices or other foreign matter. This last sophistication is very common with ground cloves, and pimento (allspice) is the substitute generally added.

It is evident that the microscope must be used for detection and identification of foreign tissues; and since cloves contain no starch the intermixture of pimento is easily detected.

Exhausted cloves are easily recognized, when whole, by their striated and shrivelled appearance; but when ground, the only way of ascertaining their appearance is a chemical analysis. The very wide range of percentage for volatile oil, makes it desirable that some minimum limit for this component should be fixed by law; unless, indeed, cloves are sold under a distinctive name, such as East Indian, American, etc., and a standard be understood or fixed for each kind. In the meantime, it is evident that while a sample containing as little as 9 per cent volatile oil may be described as of very poor quality, it cannot be held to be adulterated. It is very desirable that a study of cloves as found in the Canadian market should be made, and, if possible, a minimun for volatile oil fixed by law.

I have appended to this memorandum a synoptical study of certain (49) samples recently examined by the public analysts, as well as some analytical data obtained by myself.

GROUND CLOVES.

Serial Number.	Departmental Number.	Moisture.	Volatile Oil.	Total Volatile Matter.	Fixed Oil.	Total Extraction.	Ash.	Remarks by Analyst.	Analyst.
7	17194	6·28	3·24	9·52	6·92	16·44	4·09	Adulterated, mainly pimento ...	Kenrick
8	17195	6·32	15·33	21·65	3·31	24·96	5·69	" def. in ess. oil ...	"
10	17197	6·34	11·42	17·06	3·35	21·11	7·12	" " "	"
11	17198	6·70	11·32	18·02	3·27	21·29	6·89	" " "	"
13	17200	5·82	11·70	17·52	3·23	20·75	6·66	" " "	"
	Means..	6·29	10·60	16·89	4·02	20·91	6·09	Including No. 17194.	
	"	6·30	12·44	18·74	3·29	22·03	6·59	Excluding No. 17194.	
32	19597	7·30	11·85	19·15	6·95	23·10	9·36	Adulterated with allspice........	Fiset.
33	19598	5·85	14·00	19·85	6·36	26·21	6·10	Genuine ...	"
36	19601	6·00	14·00	20·00	5·40	25.40	5·98	Wheat starch, adulterated. ...	"
37	19602	5·10	17·55	22·65	6·70	29·35	6·40	Genuine..	"
40	19605	7·60	7·50	15·10	7·20	22·30	5·82	Adulterated with stems, &c	"
	Means...	6·97	11·12	18·08	6·52	23·60	6·05	Omitting 19598 and 19602.	
2	16736	11·22	12·00	23·22	....	......	6·76	Deficient in vol. oil..	Bowman.
4	16739	10·75	11·32	22·07	.....	..	6·37	" " "	"
16	17677	10·72	14·48	25·20		..	6·83	Genuine ...	"
17	17678	10·58	13·72	24·30	.	.	6·49	Deficient in vol. oil....	"
19	17682	10·07	12·19	22·26	....	....	6·52	" " "	"
20	17683	10·89	19·32	30·21	....	..	5·71	Genuine........	"
	Means...	10·66	12·31	22·96	......	....	6·54	Omitting 17677 and 17683.	
21	19575	9·34	8·32	17·66	2·03	19·69	7·06	Adulterated	Edwards.
22	19576	6·68	14·71	21·39	0·94	22·33	7·00	Genuine..	"
24	19578	10·98	5·27	16·25	3·73	19·98	8·85	Adulterated	"
	19585	12·09	7·13	19·22	2·11	21·33	8·33	"	"
41	19606	9·69	11·03	20·72	1·61	22·33	5·84	Genuine..	"
		10·80	6·91	17·71	2·62	20·33	8·08	Omitting 19576 and 19606.	
42	20141	5·60	4·04	9·64	9·26	18·90	6·04	Poor quality	Fagan.
3	20142	6·20	10·05	16·25	7·62	23·87	5·87	Genuine....	"
4	20145	8·10	2·90	11·00	11·82	22·82	7·37	Adulterated ..	"
46	20156	7·10	9·24	16·34	9·08	25·42	5·03	Genuine...	"
Clifford Richardson, 1887.		8·56	8·92	17.48	5·90	23·38	7·67		

WHOLE CLOVES.

Serial Number.	Departmental Number.	Moisture.	Volatile Oil.	Total Volatile Matter.	Fixed Oil.	Total Extraction.	Ash.	Remarks by Analyst.	Analyst.
6	17193	5·73	18·29	24·02	2·99	27 01	6·16	3·75 per cent stems, genuine.....	Kenrick.
9	17196	6·76	16·95	23·71	2·93	26·64	6·27	7·36 " " adulterated.	"
12	17199	5·91	17·34	23·25	3·08	26·33	6·22	1·38 " " genuine	"
14	17201	6·36	17·86	24 25	2·97	27·22	5·71	2·38 " " "	"
15	17202	6·73	16·85	23·58	2·86	26·44	6·38	9·27 " " adulterated.	"
	Means...	6·30	17·46	23·76	2·97	26·73	6·15		
31	19596	7·35	11·15	18·50	6·05	24·55	6·62	Stems and dirt, genuine.	Fiset.
34	19599	10·10	11·55	21·65	6·90	28·55	6·00	Genuine....	"
35	19600	5·05	15·70	20·75	6·90	27·65	5·62	"	"
38	19603	8·20	15·25	23·45	7·95	31·40	5·80	"	"
39	19604	8·05	12·90	20·95	7·30	28·25	5·96	"	"
	Means...	7·75	13·31	21·06	7·02	28·08	6 00		
1	16733	10·95	15·56	26·51	. ..	....	7·12	Genuine.....	Fowman.
3	16738	11·80	16·89	28·69	.....	....	6·02	"	"
5	16742	15·21	10 69	25·90	....	....	6·26	Deficient in vol. oil..............	"
18	17680	11·05	19·63	30·68	......	....	6·38	Genuine....	"
		12·25	15·70	27·94	......	. ...	6·45		
23	19577	9·95	9·35	19·30	1·25	20·56	5·85	Genuine...........	Edwards.
25	19579	10·99	8·51	19 50	1·99	21·49	7·42	Genuine, but low quality........	"
26	19580	10·08	16·00	26·08	2·55	28·63	6·60	Genuine.	"
27	19582	10·68	15·02	25·70	1·85	27·55	5·90	"	"
28	19583	8·62	15·03	23·65	2·78	26·43	6·99	"	"
29	19584	8·31	14·74	23·05	2·04	25·09	6·71	Genuine, clove stalks numerous. .	"
		9·77	13·11	22·88	2·08	24·96	6·58		
45	20148	6·30	12·78	19·08	10·23	29·31	6·91	Genuine...........	Fagan.
47	20151	8·42	11·16	19·58	9·16	28·74	5·51	"	"
48	20154	8·36	13·00	21·36	9·12	30·48	5·99	"	"
49	20155	8.49	6·93	15·42	8·07	23·49	4·96	Poor quality........	"
		7·89	10·97	18·86	9 14	28·00	5·84		
Clifford Richardson, 1887.		8·04	15·80	23·84	9·10	32·94	7·42	Bull. 13, Dept. Agriculture, Washington.	
McGill.....		.....	......	24·32	......	31 54	......	Amboyna cloves.	
"		.....	.....	23·72	. .. .	32·04	......	Zanzibar.	
"		. ..	...	13·94	.....	21·48	. ...	Separated steirs.	
"				9·46	10·60	20·06	....	Exhausted cloves.	
				9·47	11·54	21·01			

The following work was done on samples of Amboyna and Zanzibar cloves, obtained from Cochrane & Co., Ottawa ; and stems separated from these samples. Also, a sample of Exhausted Cloves entered at Hamilton Custom House.

Method.	Amboyna.	Zanzibar.	Stems.	Exhausted cloves.	Remarks.
1. Heated to 100° in a current of dry air condensing the volatile product loss	...	13.79	....	....	Result unsatisfactory.
Weight of condensed material	....	9.45	... .	....	
2. Dried over H_2SO_4 at ordinary temperature, to constant weight	4.72	5.85	....	....	Dried 54 and 30 hours respectively.
3. Dried in water oven, over night	20.08	20.88	13.94	9.46	Volatile matter.
Subsequent extraction by ether	11.46	11.16	7.54	10.60	Fixed oil, &c.
Sum	31.54	32.04	21.48	20.06	Total extractive.
4. Volatile oil by difference (3 and 2)	15.36	15.03	....	... ...	
5. Extraction of sample by ethyl ether	30.72	30.09	22.20	19.67	By loss.
Extractive dried 48 hrs. ord. temp.	23.58	22.28	7.61	....	
6. Sample soaked in petrol. ether in glass dish, then dried at 100° C.	20.72	21.52	.. .. ..	9.47	Is an improvement in the method of estimating total volatile matter.
Treatment repeated	22.80	23.42	......	.. ..	
" again repeated	24.32	23.72	......	....	
Subsequent extraction by ether	.... ..	....	....	11.54	
7. Maximum value for volatile oil, by difference (6 and 2)	19.60	17.87	.. .. ..	....	Maximum value for vol. oil.
8. Dried as in (6) but using ethyl ether	20.50	18.36	....	....	Resin dries on sides of glass.
9. Ash	5.82	5.90	....	8.20	
Sand	0.10	0.18	....	0.46	

The foregoing is to be considered as a contribution to our yet imperfect methods for valuation of this spice. It requires yet a great deal of experimental work to make our methods all that can be desired ; and I would respectfully suggest that the requisite work be done upon specially collected samples, so that at the same time we may be able to determine the average character of cloves as imported into Canada. This determination might afford the necessary data for fixation of a standard in regard to volatile oil.

I have drawn up a circular letter, addressed to importers of spices—a copy of which is herewith submitted—and I would ask your sanction for it, as likely to sucure us the kind of samples which we need for the purpose mentioned.

Respectfully submitted,

July 4, 1900. A. McGILL.

(*See draft of letter on page 167.*)

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, October 18, 1900.

THOS. MACFARLANE, Esq., F.R.S.C.,
Chief Analyst.

SIR,—On July 4 last I had the honour, as acting Chief Analyst, to submit a memorandum on the subject of *Cloves* to the Commissioner of Inland Revenue. I found that, although a considerable amount of work had been done by the public analysts, and in this laboratory, I could not come to a final decision regarding the character of the samples collected by order of the Commissioner in September and October of last year; and this for two reasons, viz:—The absence of any authoritative standards of comparison, and the very varying and often questionable methods of analysis.

With regard to the first of these difficulties, I made a suggestion that samples of whole cloves should be obtained direct from importers and examined with a view to determining standard values for certain constants, by which constants it might be possible to judge the genuineness or otherwise of commercial cloves. I am now able to place before you the results of analysis of 28 samples obtained in this way. Most of the samples were accompanied by explanatory notes, and in consequence of this it has been possible for me to arrange them in three classes, representative of (1) Penang, (2) Amboyna, and (3) Zanzibar cloves. In addition to this general classification, I have placed a value upon certain physical characters such as colour, size, etc., and have found that the perfection of the sample in these respects bears a definite relative value as indicated by chemical analysis.

Regarding methods of analysis, I can only claim to have improved these in one point, but that an important one, viz., the distinction between the two volatile proximate principles of cloves, moisture and volatile or essential oil. A very cursory examination of such recorded results of work on cloves as are available suffices to show that the analyst has found it little more than guesswork to say when, during the exposure of the ground sample to a drying atmosphere, water vapour ceases to come off and essential oil is volatilized. The matter is one of great importance, since the value of a given sample of cloves is principally dependent upon the percentage of volatile oil it contains, while the amount of water is a variable quantity, depending on the conditions under which the sample has been kept. For this reason, the value of the sample cannot be judged from the total loss of weight it sustains on being dried at 100° C. The fraction of this loss due to water may be increased by judicious treatment in such a way as to make good a very considerable abstraction of volatile oil. I have found that, on exposure of the ground sample to a very much reduced pressure (about 60 millimetres of mercury) over sulphuric acid, the vapour tensions of water and the volatile oil of cloves are so adjusted at ordinary temperatures that the whole of the aqueous vapour is absorbed by the sulphuric acid in about 24 hours, while not more than traces of essential oil are lost. This is evidenced by a study of the following experimental numbers :—

Hours Exposure	Percentage Loss of Weight.							Remarks.
	(a)	(b)	(c)	(d)	(e)	(f)	Means.	
24	5·1	5·2	....	....	.....	.....	5·15	Acid scarcely discoloured.
48	5·4	5·7	5·5	4·6	5·1	4·8	5·15	Acid distinctly brown.
72	5·8	6·1	5·8	5·1	5·2	5·3	5·55	Acid more distinctly brown.
96	.....	.....	7·3	6·1	7·1	6·3	6·70	Acid very markedly brown.
120	7 9	8·2	...	......	......	.....	8·05	Acid very dark brown.
144	8·6	9 2	......	......	......	......	8·90	Acid very dark brown.
	Desiccator No. 1.		Desiccator No. 2.					

It will be seen that a large loss of weight occurs during the first 24 hours, which is scarcely increased during the next 24 hours. The vapours coming off during this time are absorbed by the sulphuric acid without discolouring it, in other words, but faint traces of volatile oil are present. A further exposure of 24 hours but slightly increases the percentage of volatile matter lost, but this slight increase produces a very marked discoloration of the acid, and this blackening of the acid by absorption of organic matter with decomposition continues to proceed, although but slowly, indicating that the further loss of weight is entirely due to volatile oil. I found that at the end of 16 days the total loss amounted to 11·45 per cent. The advantage of treating the sample *in vacuo* is two fold : 1st, the drying proceeds more rapidly than at the ordinary atmospheric pressure. 2nd, the reduction of pressure affects the vapour tension of water vapour much more than that of essential oil of cloves. I found that under ordinary pressure this same sample of cloves lost only (a) 3.30, (b) 3·75, (c) 3·90, mean = 3·65 per cent of weight in 23 hours ; and (a) 4·10, (b) 4·60), (c) 5·45, mean = 4·72 per cent in 54 hours. There was no marked colouration of the acid in the experiment conducted at ordinary pressure ; so that it is probable that no great error in estimating moisture would be involved in leaving the sample over sulphuric acid until constant weight (or nearly so) had been reached ; but this would require at least 2½ to 3 days in the sample quoted. In six samples treated in two desiccators of similar form, placed side by side, one being under ordinary pressure (760 mm.) the other under only 60 mm. mercury, the following results were obtained for six hours :—

LOSS OF WEIGHT PER CENT.

—	1.	2.	3.	4.	5.	6.
Reduced pressure................	5 65	6·25	5·7	6·5	6 45	6·15
Ordinary pressure..................	4·65	5·15	4·65	4·85	4·95	5·20
Difference	1 00	1·10	1·05	1·65	1·50	0·95

The total volatile matter (sum of moisture and volatile oil) is obtained by exposing the sample to a temperature of 98° C. for 24 hours. A possible improvement in this determination consists in the previous treatment of the sample with re-distilled petroleum ether, in the same capsule in which the ultimate drying is effected. To the capsule, containing a weighted quantity (2 grammes) of the sample, is added 25 cc. ether. This is allowed to stand for several hours at the ordinary temperature, during which time the ether takes the fatty matter and oils into solution, and the solvent gradually volatilizes. On drying in the oven, the volatile oil is more rapidly separated than when no ether treatment is given.

Three samples gave the following results :—

	(1)	(2)	(3)
After ether treatment	20·72	21·52	9·47
Without ether	20·08	20·88	9·46
Differences	0·64	0·64	0·01

On repeating the treatment with ether a further loss of weight occurred, as follows :—

	(1)	(2)
Second treatment with ether and drying	23·86	23·42
Increased loss on second treatment	3·14	1·90
Third treatment with ether	24·32	23·72
Increased loss on third treatment	0·46	0·30

This seems to indicate that the ordinary mode of determining total volatile matter does not suffice to get rid of all the volatile oil, but that a 48-hour treatment is needed, even when the oil is freed from the cellular tissue by the use of a solvent. In this case the numbers given for volatile oil in the appended tables will be about 2 per cent too low, a consideration not to be overlooked in deciding as to the reasonableness of the minimum limit for volatile oil which I have recommended for adoption.

The following tables, with prefixed explanatory notes, give the results of work on samples specially obtained for this examination.

In July last I addressed the following circular letter to some ten or twelve of the leading importers of Canada :

" Dear Sir :

" This laboratory is desirous of making a study of cloves (clous de girofle) for the purpose of determining certain characteristics of this spice, which has never been as carefully studied as it deserves, and regarding which very little information is on record.

" It is desirous to procure half-pound samples of as many separate importations of the whole spice as possible. Will you kindly furnish such samples, representing as many different grades of the spice, as you can and send memo. of price with the same? If you have samples of exhausted or partially exhausted cloves, these also are desired.

" It will be understood that these samples are not collected in the ordinary way ; nor is it intended to publish the names of those who furnish them."

Nearly, or quite, all of those asked sent one or more samples, and twenty-eight (28) samples were received. These represented the following grades, as described by the importer.

Penang cloves	8	samples.
Amboyna cloves	3	"
Zanzibar "	13	"
West Coast "	1	"
Not named	2	"
Stems	1	"
Total	28	

The following table gives the results of analysis of these samples; and it is to be observed that *moisture* has been determined by drying the ground sample over sulphuric acid *in vacuo* for 24 hours; the *Total volatile matter*, by exposing the ground sample to a temperature of 98° C. for 18 hours; and the *Total extractive matter* by treating the dry substance wirh petroleum ether in a Soxhlet tube. All these operations were carried out in duplicate and closely agreeing results were obtained.

Care was taken to grind all the samples to the same degree of fineness.

The column headed *Quality* contains a number obtained as follows. I carefully examined all the samples of each kind by spreading on paper, and taking into consideration the following physical characters:

1. Colour.
2. Size.
3. Plumpness.
4. Retention of so-called 'bud.'
5. Freedom from stems, etc.

The best samples of each kind I have graded as 1st quality; the worse ones as 2nd quality; and in a few cases, being unable with certainty to assign to either of these grades, I have given the number 1½. It is to be noted that this classification or grading was made quite independently of the results of analysis and it is interesting to observe how the physical characters of the whole clove give a suggestion as to its chemical characters.

PENANG CLOVES (Whole).

Number.	Moisture.	Total volatile matter.	Volatile oil	Total extractive matter.	Fixed oil.	Quality.	Remarks.
1	5·0	21·2	16 2	28·2	12·0	1	
2	7·4	24·0	16·6	27·0	10·4	1	
3	5·8	20·7	14·9	24·4	9·5	2	Off colour and resembled Zanzibar samples.
4	5·2	22·4	17·2	27·1	9·9	1	
5	6·9	21·7	14·8	26·5	11·7	1	
6	6·9	23·2	16·3	28·1	11·8	1½	A few stems.
7	7·1	24·3	17·2	28·2	11·0	1	
8	5·5	21·6	16·1	26·2	10·1	1	
Mean	6·2	22·4	16·2	27·0	10·8	....	

Ratio of volatile oil to fixed oil = 100 : 67.

AMBOYNA CLOVES (Whole).

Number.	Moisture.	Total volatile matter.	Volatile oil.	Total extractive matter.	Fixed oil.	Quality.	Remarks.
9	6·7	25·9	19 2	29·2	10·0	1	
10	5·5	23·5	18 0	26·7	8·7	1	
11	6·0	24·3	18·3	26 5	8·2	1	
Mean	6·1	24·6	18·5	27·5	9·0	....	

Ratio of volatile oil to fixed oil = 100 : 49.

Zanzibar Cloves (Whole).

Number.	Moisture.	Total volatile matter.	Volatile oil.	Total extractive matter.	Fixed oil.	Quality.	Remarks.
12	5·1	22·4	17·3	25·3	8 0	1	
13	6·0	24·3	18·3	28·1	9·8	1	
14	5·4	22·9	17·5	27·0	9·5	1	
15	5·7	18·4	12·7	21·3	8·6	2	Stems and shrunken buds.
16	6·3	22 9	16·6	26·3	9·7	1	
17	5·7	22·1	16·4	26·1	9·7	1	
18	6·5	18·6	12·1	22·3	10·2	2	Like No. 15.
19	6·5	21·0	14·5	25·2	10·7	2	" No. 15.
20	6·2	23·6	17·4	27·8	10·4	1	
21	4·6	22·1	17·5	......	......	1	
22	4·1	21·4	17·3	......	......	1	
24	6·7	20·8	14·1	......	......	1½	Stems.
26	5·8	21·1	15·3	......	......	1½	"
Means	5·7	21·7	16·0	25·5	9·6	....	
Omitting Nos. 15 and 18	5·7	22·2	16·5	26·8	10·3	.....	

Ratio of volatile oil to fixed oil = 100 : 59. Ratio (omitting samples 15 and 18) = 100 : 62.

Unclassified Cloves (Whole).

Number.	Moisture.	Total volatile matter.	Volatile oil.	Total extractive matter.	Fixed oil.	Quality.	Remarks.
23	7·5	17·4	9·9	......	......	2	'West Coast' cloves.
25	6·9	21·9	15·0	......	......	1	
27	4·4	16·7	12·3	......	......	2	
28	7·5	13·4	5·9	......	......	...	Clove stems.

It is to be noted that—so far as those samples are concerned which would grade *Number 1* on the basis of their physical properties, the maximum and minimum percentages of volatile oil are as follows :—

	Maximum.	Minimum.	Mean.
Penang	17·2	14·8	16·2
Amboyna	19·2	18·0	18·5
Zanzibar	18·3	16·4	16·0
Mean, for a mixture of the three kinds in equal weights	18·2	16·4	16·9
Values found by Clifford Richardson	18·89	10·23	15·63

The lowest value for volatile oil which I found for any *whole clove*, claiming to be genuine, is 12·1 in No. 18 (Zanzibar). I am certain that neither this sample, nor numbers 15, 19, 24, 23 or 27, would be considered other than low grade by dealers who are in the habit of handling cloves.

I am therefore of opinion that no sample of cloves claiming to be of good quality should yield less than 14 per cent of volatile oil when assayed by the methods which I have described. If total volatile matter is determined by treatment with petroleum ether before drying at 98° C.—this treatment being repeated as described on page 167—the minimum volatile oil found should be 16 per cent by weight.

I respectfully submit the foregoing for your consideration, and remain.

Your obedient servant,

A. McGILL.

REPORT

OF THE

MINISTER OF AGRICULTURE

FOR THE

DOMINION OF CANADA

FOR THE

YEAR ENDED OCTOBER 31

1900

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EXCELLENT MAJESTY
1901

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REPORT

OF THE

MINISTER OF AGRICULTURE

1900

To His Excellency the Right Honourable Sir Gilbert John Elliot, *Earl of Minto and Viscount Melgund of Melgund, County of Forfar, in the Peerage of the United Kingdom, Baron Minto of Minto, County of Roxburgh, in the Peerage of Great Britain, Baronet of Nova Scotia, Governor General of Canada.*

May it Please Your Excellency—

I have the honour to submit to Your Excellency the annual report of the Department of Agriculture, for the year ended October 31, 1900.

I.—GENERAL REMARKS.

A synopsis of the work of the department and of the operations of the various branches comprised therein is laid before Your Excellency. The work in each has been efficiently carried out.

The legislation affecting the department during the last session consisted of Chapter 10, 63-64 Vic., intituled 'An Act to Authorize Contracts with Certain Steamship Companies for Cold Storage Accommodation.'

Chapter 25, 63-64 Vic., 'An Act to Amend the Copyright Act.'

Chapter 30, 63-64 Vic., 'An Act to Amend the Experimental Farm Station Act.'

Chapter 31, 63-64 Vic., 'An Act to Amend the San José Scale Act.'

Also, Chapter 33, 63-64 Vic., 'An Act Respecting the Incorporation of Live Stock Record Associations.'

By an order approved by Your Excellency in Council on March 13, 1900, in virtue of the provisions of section 2 of chapter 68 of the Revised Statutes of Canada, intituled 'An Act Respecting Quarantine,' the quarantine regulations, as made and amended by orders in council dated August 18, 1898, and April 4, 1899, respectively, were further amended.

By proclamation dated March 13, 1900, the amendment to the quarantine regulations made by the order in council above referred to, was published in the *Canada Gazette* (vol. xxxiii, p. 2005).

Also, by order in council under date of April 25, 1900, under the provisions of section 5 of 'The San José Scale Act,' the order in council dated March 18, 1898, was amended.—(*Canada Gazette*, vol. xxxiii, p. 2308.)

Strong representations having been made to me with regard to the need of protection for Canadian authors and publishers similar to that enjoyed by such persons in the United Kingdom, I took into careful consideration the whole question of Canadian copyright with the view of discovering, if possible, a means to remove the causes of the friction and clashing that had existed for some time between those in Great Britain and those in Canada who are interested in copyright.

My conclusions were that Canadian authors and publishers had reason to complain of their position under Canadian copyright, and that they might reasonably expect better protection from unjust competition. Notwithstanding previous doubts, it seemed to me that it was possible to remove the causes of friction by judicious legislation. With this object in view, last session I introduced a Bill, 'An Act to amend the Copyright Act,' which duly became law, and I am happy in the belief that this enactment, which has met with general approval, has been the means of placing all in any way interested in copyright in Canada upon a better footing and of securing for them equitable and adequate protection from unjust competition. And I may add that in this belief I am not alone, both parties agreeing that the action taken will be of great advantage, and will put matters upon a much better footing. That this feeling should prevail amongst those so closely connected with copyright and whose judgment therefore is valuable, is a further source of gratification.

UNIVERSAL EXPOSITION, PARIS.

Canada's display at this great exhibition has done much to give her a leading place amongst the nations of the world. The exhibits of natural products and manufactured articles attracted much attention, and have been very favourably commented upon by the press. Nothing better could have been devised to advertise the vast resources of the Dominion than the excellent display of economic minerals and other natural products, while the manufactured goods were very tangible illustrations of the great progress which has been made in industrial arts in this country during the past few years.

As a result of this exhibition I think we may confidently expect that more home and foreign capital will be diverted to Canada for investment in Canadian undertakings, and that there will be an increase in our foreign trade in manufactured goods and natural products.

To indicate the general excellence of the Canadian exhibits it is only necessary to give the number of awards which were gained, viz.:

Grand prix, diplomas	30
Gold medal diplomas	76
Silver medal diplomas	95
Bronze medal diplomas	70
Honourable mention diplomas	35

The Hon. J. Israel Tarte, M.P., Minister of Public Works, was appointed Chief Commissioner for Canada at the Universal Exposition at Paris, and spent several months there in the interests of the Dominion.

The following also assisted in the representation of Canada as Honorary Commissioners:—

Madame Raoul Dandurand, Honorary Lady Commissioner.

Hon. F. G. M. Dechene, Honorary Commissioner.

Hon. F. E. A. Evanturel, Honorary Commissioner.

Rev. Father C. P. Choquet, Honorary Commissioner.

Hon. Thomas Ballantyne, Honorary Commissioner.

During the summer of 1901 an International Exhibition will be held at Glasgow, Scotland, in which Canada has been invited to participate.

Realizing that a Canadian exhibit there, similar to the one we had at Paris, would be the means of bringing the excellence of our products more directly before the British public and result in an increased trade with the motherland, the Canadian Government has accepted the invitation, and parliament has voted a sum of money to defray the expenses of an exhibit.

A large number of the exhibits used at Paris will be forwarded direct to Glasgow. Those which have deteriorated in any way will, of course, be replaced by fresh ones, and the exhibits of fruits, dairy produce, &c., will be entirely new.

A notice of this exhibition has been published in the *Canada Gazette* for the information of those who may desire to have exhibits at the Exhibition.

II.—ARTS AND AGRICULTURE.

COMMISSIONER'S BRANCH.

GENERAL SCOPE OF THE WORK.

About forty-five per cent of the population of Canada are in families whose heads and members are engaged in farming. A large number more are employed in industries arising out of agriculture. Among these are millers of flour and oatmeal, curers and packers of meats, makers of cheese and butter, and persons occupied in the transportation and commerce of grain, hay, live stock, meats, butter, cheese, milk, eggs, fruit and various other products.

The difficulties in the way of successful farming become greater and more numerous every year. Some of them arise from the partially exhausted condition of the soil in localities; and from the need for maintaining or increasing the fertility in all places. The simple cultivation which prepared a suitable seed-bed out of virgin soil is no longer sufficient. Weeds also—the thieves of plant food—are becoming more and more an ever present trouble. The greatest difficulties are mainly of four sorts : (1) Those which beset the farmers in the growing and saving of crops ; (2) those which arise from the demands of markets for superior qualities of all products , (3) those which come from the change from the cultivation of cereals and hay to diversified or mixed farming consequent on the growth of population in cities and towns, and the new opportunities provided for exporting fine perishable products through cold storage and other improved transportation facilities ; and (4) those which result from the low prices for the most of the staple farm products through the world-wide keen competition.

The department continues its efforts to help the farmers by those means which have been used successfully in past years. One of the main objects is to furnish information which will be directly helpful to those engaged in farming, and which will at the same time have an educational value through developing intelligence and practical ability, and promoting such co-operation as will lead to the further advancement of their interests.

THE OPERATIONS OF FARMING.

It is essential in all profitable agriculture to obtain large crops of good quality at as little expense as possible. After a farmer has settled upon the areas of crops which he will put in, there remains the matter of selecting the particular variety of each sort of seed he will sow or plant. The department is trying to impress upon the minds of the farmers the benefits which may be expected from carefully selecting the best quality of seed from varieties which are adapted to their localities.

Improvements are being made in field cultivation, particularly in a more general following out of some systematic rotation of crops, in the growing of clover, and in the greater attention being given to the selection of seed grain.

In this connection it is with pleasure I mention the fact that Sir William C. Macdonald generously placed the sum of ten thousand dollars in the hands of Professor Robertson to be offered in prizes to encourage boys and girls on Canadian farms 'to learn by doing,' to select seed-grain in such a manner as to grade up its productiveness, and to keenly follow up the practices as well as the principles of progressive agriculture.

The feeding of the crops or part of them to live stock is also essential to successful farming in Canada; and the better the crops of cereals, fodder and roots, the better is the chance to make the live stock of the farm pay. The feeding of live stock also makes provision for using up some inferior grains and other things not saleable, and turning them into superior qualities of animal products. To do that profitably gives room for the exercise of skill, wide exact knowledge and true economy.

A large portion of the bulky products of the farms is consumed by live stock. A marked improvement is evident in the stabling of horses, cattle and swine. Numerous buildings are constructed every year, well lighted, comfortable and convenient. Sufficient attention has not yet been paid generally to the ventilation of stables.

On the whole the live stock is fed with greater economy as the relative values of feeding stuffs become better known among farmers. In that respect the practices of the best farmers are readily copied by others.

Progressive improvement of live stock has been hindered more or less from want of continued attention year after year to the formation of a definite type of body suited to the main purpose of each breed of every sort of live stock. The climate of Canada and its suitability for growing large crops of wholesome nutritious forage plants, make it possible for this to be a breeding ground for the best types of live stock. To succeed it is evident that educational work must be pushed wisely and energetically. If that be done there does not appear any reason why the breeding of horses, the breeding of beefing types of cattle, the breeding of sheep, and the breeding of poultry for fattening, should not make proportionately as much advance per year as has been made in the development of dairying and of the cheese, butter and bacon trades.

Another essential to a continuation of good farming is ability to keep up the fertility of the land without purchasing fertilizers to such an extent as to absorb all or most of the profits. The growing of clovers, pease, beans and other leguminous crops, the feeding of them to live stock, and a careful saving of everything on the place that has manurial value, are in the right direction. The department tries to direct attention to these fundamental principles which are still apt to be overlooked in farm practice.

THE PRODUCTS FROM FARMS.

Whether a farmer sells what may be called primitive raw products, such as grain, hay, roots, or other crops, or feeds these to live stock, and markets them in other forms, reduced in volume but increased in value, as in butter, cheese, cattle, swine, poultry, eggs, horses, sheep or wool, he needs reliable information on the qualities of those for which there is likely to be a good demand and a fair price. Sometimes that information is thrust upon him harshly enough, by close market contact—by getting only a ruinously low price for what he has to sell, if it proves unsuitable for the market he supplies. As far as the department through its various agencies can help the farmers in that matter, it is endeavouring to do so.

Much information of practical value has been obtained from time to time from those engaged in the commerce of agricultural products, and from those who manufacture what may be called the raw products of the farm. Curers of bacon, exporters of cheese and butter, shippers of live stock, flour millers and others, have greatly assisted the department by specific information on the qualities of products which are in demand for the home and export trades. Farmers are becoming more and more alive to the benefits that result from co-operating with such men in those matters.

Fine food products, such as meat, butter, poultry, eggs, and to some extent fruit and cheese, are of a readily perishable character, and cannot be delivered in distant markets in their best condition without special accommodation for carrying them safely. Any absence of freshness and daintiness of flavour and appearance lessen their value very greatly. It is evident that the production of such foods, even when carried on in the most skilful and economical manner, cannot be permanently profitable unless means are used for their preservation, so that the consumer can obtain them in an undeteriorated state.

Bulletins and reports for imparting information have some value, particularly to the investigating farmers. The department has availed itself of these means. The agricultural press and the newspapers of Canada have given valuable assistance in publishing what has been supplied to them, in a most liberal and effective way.

Much of the time and energy of the commissioner's branch have been taken up in correspondence and the giving of personal advice and information to farmers, and others connected in some capacity with the art or business and commerce of agriculture.

In so far as the work of the department directly for farmers can take the character of object lessons to illustrate principles, practices and methods, it will the more speedily tell for good on their occupation.

The chief other matters to which attention was given in this branch in 1900 were : the work of the Live Stock Commissioner, the cold storage service, the extension of markets, trial shipments of tender fruits, an examination into the condition of cheese, butter and apples being exported, with special reference to the packages and handling of the same in loading and unloading ocean steamships, the carrying on of illustration stations for the fattenting of chickens, and the exportation of the same to Great Britain, the curing of cheese at a controlled cool temperature, and general dairying service.

LIVE STOCK COMMISSIONER'S DIVISION.

During the past year, the Live Stock Commissioner has made a careful examination of the live stock conditions in each of the provinces and territories. Where needed, assistance has been given in the establishment of live stock associations, with the view to inducing the farmers to unite in self-help, and also that the department may be brought in touch with the best men in each district, and thus obtain their united co-operation in forwarding the live stock interests of Canada.

Much information of a practical and useful nature has been distributed during the year in the form of circular letters addressed directly to farmers and stock growers, to secretaries of local live stock associations, farmers' institutes, fair boards and kindred bodies. Upwards of 25,000 of these circular letters have been sent out during the year. Much information has also been sent to the people in the form of newspaper articles which have been forwarded to the leading agricultural and weekly papers published in the various sections of Canada.

The rules and regulations governing the Live Stock Record Associations have been carefully investigated and an effort has been made to consolidate a number of these associations to the end that there be but one record for each recognized breed in Canada, and that this record be conducted in the best possible way. Heretofore these associations, though Dominion in scope, have not been incorporated by the Dominion government.

A large number of public meetings have been addressed by the commissioner and by members of his staff. These gatherings have been well attended, and considerable interest has been aroused.

The establishment of annual auction sales of live stock for breeding purposes has been brought to the notice of the people. British Columbia has taken the matter up, and has recently held a successful sale ; and in Ontario two provincial sales are announced.

COLD STORAGE DIVISION.

Cold storage is intended to preserve commodities and thus avoid direct loss ; it is useful to extend the period during which they can be marketed ; and it thus gives the owners a wider chance to choose their own time for selling. The best service is to be obtained from cold storage by its use for the preservation of commodities on their way to the consumers. The less time they are on the way, as a rule, the better will be the ultimate results.

In the planning and carrying out of a system of cold storage for Canada, various interests have to be taken account of, viz.: the producers, the collecting buyers, the carriers or transportation companies, the distributing merchants, and the consumers, In so far as a cold storage system helps to prevent losses and deterioration of quality, it gives every handler a chance for more profit and leaves more wealth in the country. The arrangements have been made mainly for cold storage for food products intended for export. Advantages have been provided incidentally for products for home consumption.

With what is practically a chain of cold storage available, the superior quality of Canadian products will be further recognized by importing merchants and consumers in the countries to which they go.

COLD STORAGE ON STEAMSHIPS.

Contracts were entered into with agents of steamship companies to provide a regular cold storage service for the carriage of butter and other perishable products from Montreal to points in Great Britain, in chambers cooled and kept cool by mechanical refrigerating machinery of the best and most modern sort.

Messrs. Elder, Dempster & Co. agreed to provide cold storage on five steamships to give a weekly service between Montreal and Avonmouth for Bristol.

Messrs. H. & A. Allan agreed to provide cold storage on two steamships to ply between Montreal and Liverpool ; three steamships to ply between Montreal and London ; and on one steamship to ply between Montreal and Glasgow.

Messrs. R. Reford & Co., for the Thomson Line, agreed to provide cold storage on three steamships to ply between Montreal and London ; and, on behalf of the Donaldson Line, on one steamship to ply between Montreal and Glasgow.

Messrs. David Torrance & Co., for the Dominion Line, agreed to provide cold storage on two steamships to ply between Montreal and Liverpool.

Sailings of the steamships of the Allan and Dominion lines between Montreal and Liverpool were to be so arranged as to give as nearly as practicable a weekly service between these two ports ; and the sailings of the steamships of the Allan and Thomson lines were to be so arranged as to give as nearly as practicable a weekly service between Montreal and London ; and the sailings of the steamships of the Allan and Donaldson lines were to be so arranged as to give as nearly as practicable a fortnightly service between Montreal and Glasgow.

These contracts, which were for three years, expired at the end of navigation from Montreal in 1899.

Messrs. Furness, Withy & Co., Limited, agreed to provide cold storage on two steamships to ply between St. John, N.B., Halifax, N.S., and London.

The Manchester Liners, Limited, agreed to provide cold storage on three steamships to ply between Montreal and Manchester during the season of navigation on the St. Lawrence River, and to ply between St. John, N.B., Halifax, N.S., and Manchester during the remainder of the year. These contracts were for the seasons of 1898, 1899 and 1900.

These contracts provided that the steamship companies shall carry in cold storage butter, cheese and other perishable products, as demand for space may arise, at a charge not exceeding ten shillings per ton of 2,240 pounds of butter and cheese, and at the same charge for an equivalent space occupied by other products, in addition to the current charge for freight on butter and cheese not in cold storage.

Messrs. Pickford & Black agreed to provide cold storage on the steamship *Beta*, to ply between Halifax, N.S., and the West Indies.

New contracts were entered into with the agents of lines to Liverpool, Glasgow and London for increased cold storage accommodation to these ports. Messrs. H. & A. Allan agreed to provide cold storage on three more steamships to ply between Montreal and Liverpool ; they also agreed to provide cold storage on two steamships to ply between Montreal and Glasgow, and to leave two steamers for Liverpool and one steamer for Glasgow, which were fitted for cold storage under the contracts which expired in 1899, on these routes without any further subsidy, for the seasons of 1900 and 1901.

Messrs. R. Reford & Co., for the Thomson Line, agreed to provide cold storage on three more steamships to ply between Montreal and London ; and to leave three other steamers which were fitted with cold storage under the contracts which expired in 1899, on the route without further subsidy for the seasons of 1900 and 1901. Messrs. R. Reford & Co., for the Donaldson Line, agreed to provide cold storage on two more steamships to ply between Montreal and Glasgow ; and to leave one other steamer, which was fitted with cold storage under the contract which expired in 1899, on that route without further subsidy for the seasons of 1900 and 1901.

These contracts provide that the steamship companies shall carry in cold storage butter, cheese and other perishable products, as demand for space may arise, at a charge not exceeding fifteen shillings per ton of 2,240 pounds of butter and cheese, and at the same charge for an equal space occupied by other products, in addition to the current charge for freight on butter and cheese not in cold storage.

The whole of the cold storage space on all the steamships from the beginning of the service, has been reserved to Canadian shippers until within four days of the sailing of the steamships.

The following is a statement of the quantities of some Canadian products carried in cold storage from the port of Montreal during the seasons of navigation of 1898, 1899 and 1900 respectively :—

		1898.	1899.	1900.
Butter	packages	209,172	429,734	227,863
Cheese	"	5,514	1,406	......
Fruits	"	25,564	16,381	8,785

A self-registering thermometer, called a thermograph, and capable of making a continuous record of the temperature for fourteen days was put into nearly every cold storage chamber every voyage. The charts made by these instruments were sent back to the department after the cargo was discharged. They furnish useful information to the shippers, to the ship's engineers and the department.

COLD STORAGE ON RAILWAYS.

Arrangements were continued for the running to Montreal of refrigerator cars fully iced from fifteen starting points on the Canadian Pacific Railway, from sixteen starting points on the Grand Trunk Railway, from two starting points on the Quebec Central Railway, from two starting points on the Intercolonial Railway, from five starting points on the Canada Atlantic Railway, from one starting point on the Quebec and Lake St. John Railway, and from two starting points on the United Counties Railway. Six of these ran once a fortnight, the other thirty-seven ran weekly.

The railway companies provided the refrigerator cars, and every car was iced to receive butter and other products requiring cold storage, at stations between the starting point and destination. Shippers who made use of these refrigerator cars were charged the regular 'less than carload rates,' and no extra charge was made to them for the cold storage services.

COLD STORAGE WAREHOUSES.

Cold storage warehouses of sufficient capacity for the trade are provided in Montreal as private business concerns. For the protection of perishable products intended for export and for the extension of business, it is desirable to have cold storage buildings at other centres. As the volume of trade at first would not likely be sufficient to induce business men to put up such buildings for the accommodation of products intended for export, a grant was offered to those who would provide cold storage buildings at central points. The grants were to be in the nature of guarantees that the earnings from the cold storage business at these points would yield at least 5 per cent on the cost of the buildings and plant.

The rates to be charged were to be satisfactory to the Department of Agriculture, and the grants from the government were not to be called upon, except to make up any deficiency between the net earnings and the sum of 5 per cent on the cost as mentioned. Advantage was taken of this offer at Quebec only.

An agreement was made with Messrs. B. and M. Rattenbury, the owners of a cold storage building at Charlottetown, P.E.I., to provide cold storage there for the use of the public at reasonable rates.

COLD STORAGE AT CREAMERIES.

To encourage the owners of creameries to provide cold storage accommodation at them to protect the butter in cold storage from the day after it is made, I caused it to be announced that the government would, subject to ratification by parliament, grant a bonus of fifty dollars ($50) per creamery for every creamery at which the owner would provide and keep in use a refrigerator room according to the plans and regulations, during the season of 1897 ; and further bonuses of twenty-five dollars ($25) per creamery for 1898, and of twenty-five dollars ($25) per creamery for 1899, if and when the refrigerator room was provided and kept in use according to the plans and regulations during these years.

Plans showing the style of construction to be adopted for the insulation of old cold storage rooms and the methods of constructing new cold storage buildings and ice houses were furnished on application.

When the bonus was made available for those years, a great many of the owners of creameries did not appear to understand the benefits which would result to themselves from providing cold storage; and some did not learn of the offer of the government bonus in 1897 in time to construct the cold storage for use during that summer. To encourage the owners of creameries to provide the cold storage which is so necessary, I intimated that the government would extend the provisions of the bonus offered in the circular published October 26, 1896.

To the owners or lessees of creameries who did not obtain the bonus of fifty dollars ($50) for 1897, 1898 or 1899, the government will grant a bonus of fifty dollars ($50) per creamery if and when its owner provides and keeps in use a refrigerator room according to the plans and regulations during the season of 1900, and the further bonuses of twenty-five dollars ($25) each for the seasons of 1901 and 1902, if and when the refrigerator room has been kept in use according to the regulations during these two seasons.

Thus the owner of a creamery who provides the necessary refrigerator room and keeps it in use according to the regulations during the three years ending 1900 or 1901 or 1902, as the case may be, may receive altogether a bonus of one hundred dollars per creamery.

The owners of over 400 creameries have provided cold storage in accordance with the regulations.

COLD STORAGE INSPECTORS.

Inspectors of cold storage visited creameries which had provided cold storage rooms through Ontario and Quebec. They also visited places where cold storage buildings were being put up for the protection of general food products of a perishable character. Another cold storage inspector, with headquarters in Montreal, inspected the refrigerator cars on their arrival, examined the cold storage chambers on steamships, and looked after any through shipments of butter or other perishable products intended for cold storage, when notified by the shippers to do so.

EXTENSION OF MARKETS DIVISION.

By my direction the Commissioner of Agriculture and Dairying visited some points in Great Britain during the summer. He continued inquiries on the existing conditions of the markets for perishable farm products there, sought to learn the preferences for styles of packages and quality of goods, and gave information to merchants concerning the arrangements made by the government for providing a cold storage service for the carriage of these products.

Four agents of the department have been sent to work in Great Britain for the extension and improvement of trade in Canadian farm products. They have been instructed to observe and examine carefully the manner in which the products are handled in the unloading of the steamships for the purpose of enabling the department to take such steps as may be necessary to prevent the damage to cheese and fruit, which has been complained of by shippers and receivers from want of effective cool ventilation on steamships. The want of care in unloading, in handling on the docks, and in carting to the railways and to warehouses, has in the past broken and injured a large percentage of the packages. The representations of these agents of the department have already contributed to the means which have brought about a noticeable improvement during the season.

By my direction the Commissioner of Agriculture and Dairying took supervision of the food products branch of the Canadian exhibition at the Universal Exposition at Paris. He also visited Paris in connection with the installation of cold storage chambers in the colonial building there. These were used successfully during the summer season. Butter, cheese, eggs and other readily perishable products from Canada were exhibited in cold storage there in perfect condition. Apples of many varieties—some of them of early ripening sorts, such as Fameuse and Gravenstein—were shown in quantities in Paris in perfect condition in June, July and August of this year. They had been kept in cold storage in Montreal until May, when they were sent in one of the many cold storage chambers, arranged for by the department, on steamships, during the past three years. Pears, peaches and grapes were also exhibited in fine condition in their season. This success is an evidence of the effective character of the cold storage facilities provided for the preservation and transportation of fruit when care is exercised in the selection and packing of it.

The Commissioner again reports to me that the superior qualities of Canadian flour for bread-making are not generally known by bakers or those who are directly interested. For sweetness, whiteness and strength, Canadian flour is unsurpassed. Bakeries for the sale of bread made from Canadian flour would doubtless be a profitable commercial venture for some business men in Great Britain, and would be of direct benefit to Canadian producers.

Independent analyses of various flours showed the quantity of albuminoids (flesh-forming principles in food) to be one-tenth greater in Canadian flour than in the flour imported into Great Britain from European countries.

The export trade in Canadian oatmeal is growing, and the fine qualities which it has from the soil and climatic conditions of Canada, are causing it to be preferred wherever it is introduced.

Inquiries and examination of Canadian cheese in several of the large commercial centres revealed the fact that most of it until September had been landed in Great Britain in a better condition than in some of the previous years. However, a large proportion of the boxes had been broken in transit. That tells against it in the markets. An investigation was begun at two cheese factories in Canada in 1899, as to the effect on the quality of the cheese of curing them during the summer months in a controlled cool temperature continuously under 65 degrees Fahr. That was continued at one factory during 1900. It is evident that through the improvement in curing rooms at cheese factories, and by improved cool chambers in the steamships, it will be possible to deliver Canadian cheese in Great Britain with the flavour and quality as fine as those of the best English and Scotch.

There was a great development in the Canadian butter trade until the spring of the current year. The exports increased in value from $697,476 for the year ending June 30, 1895, after which the cold storage service was provided, to $5,122,156 for the year ending June 30, 1900. The decrease in the quantity manufactured and exported since that date has been due to the relatively high price of cheese. Many factories at which butter was made in 1899 were devoted to cheese-making during the summer of 1900.

There has been substantial increase also in the exports of bacon, hams and pork. Canadian brands are now among the best known in the United Kingdom and the quality is winning for them a steady growing demand. Some complaint was again made about the quality of some Canadian bacon. A little of it was complained of as being too fat, and a proportion of it as being somewhat soft. Soft sides often fetch from four to eight shillings per hundred weight less than firm sides of similar weight and otherwise apparently equal quality.

It was learned from dealers in eggs that Canadian eggs were gaining in favour. The Canadian package is preferred to all others, and the Canadian eggs in size, condition and flavour are generally giving satisfaction. When the eggs were carried in cold storage on the steamships, the surface was so cold that moisture from the humid and warm air of Great Britain, was deposited on the outside of each egg. That brought about a 'mussy' condition and prevented the egg from keeping well. Consequently the importers prefer to have the eggs delivered in a cold condition to the steamship, and then carried in cool, ventilated chambers across the ocean. That leaves them with bright, dry shells when the cases are opened.

The export commerce of the country in most of the farm products is increasing at a very rapid rate. The following comparative statement of the value of the exports of some of the farm products of Canada during the years 1896 to 1900, shows the growth in that short period and indicates somewhat of the great possibility for further expansion of this trade :—

VALUE OF SOME CANADIAN FARM PRODUCTS EXPORTED IN YEARS 1896, 1897, 1898, 1899 AND 1900.

(Years ending June 30.)

——	1896.	1897.	1898.	1899.	1900.
	$	$	$	$	$
Wheat	5,771,521	5,544,197	17,313,916	7,784,487	11,995,488
Flour	718,433	1,540,851	5,425,760	3,105,288	2,791,885
Oats	273,861	1,655,130	3,041,578	3,268,388	2,143,179
Oatmeal	364,655	462,949	554,757	396,568	474,991
Pease	1,299,491	2,352,891	1,813,792	1,955,598	2,145,471
Cattle	7,082,542	7,159,388	8,723,292	8,522,835	9,080,776
Cheese	13,956,571	14,676,239	17,572,763	16,776,765	19,856,324
Butter	1,052,089	2,089,173	2,046,686	3,700,873	5,122,156
Pork, bacon and hams	4,446,884	5,871,988	8,092,930	10,473,211	12,803,034
Eggs	807,086	978,479	1,255,304	1,267,063	1,457,902

FATTENING OF CHICKENS.

Two years ago an investigation was made of the method followed for the artificial fattening of chickens in Great Britain. The demand for well fattened chickens is growing rapidly and extensively. In 1898 I authorized the establishment of two poultry-fattening stations, to test the process of poultry-fattening in Canada and to illustrate how it could be applied. Trial shipments of these fattened poultry were forwarded to Liverpool and London. The reports received state that the poultry arrived in fine condition, pleased the trade well in every way and were sold at good prices.

In 1899 I authorized the establishment of eight additional illustration stations for the fattening of chickens. Reports of those which were shipped to Great Britain indicate that there is an opening for the growth of a large trade. The chickens have been landed in good condition, have pleased the consignees, and have been sold at relatively good prices. Similar illustration stations have been carried on in 1900. The investigations and shipments confirm the expectation that this new branch of production may be extended with much profit.

TRIAL SHIPMENTS OF FRUIT.

Special provision was continued for making trial shipments of tender fruits, such as pears, tender apples and peaches in 1897, 1898 and 1899. A small cold storage building was provided at Grimsby, Ontario. The information which has been gained by the trial shipments for three years shows that pears and the early tender varieties of apples can be shipped in cold storage, landed in good condition and sold readily at satisfactory prices. It is important that the fruit should be picked in the right condition of ripeness for the particular variety. Only fruit of large size, good shapes and fine colour should be exported. Some of the shippers in the Niagara district desired to send further trial shipments on their own account and responsibility in 1900. A full report of these and of the former shipments will be published.

DAIRYING SERVICE DIVISION.

It gave me pleasure to be able to comply with requests from representative salesmen of butter and cheese factories, supported by the leading buyers and exporters of dairy products in Montreal, and to arrange for an official referee for butter and cheese at that port. His duties are to examine any butter or cheese about the quality of which there may be a difference of opinion or dispute between the seller and the buyer. He reports to both on the quality, and, where practicable, writes to the manufacturer suggesting what may be done to prevent or remedy such defects or faults as he may find in the lots examined. Mr. J. A. Ruddick, formerly one of the commissioner's staff of workers, who, in the meantime, had been in New Zealand as dairy commissioner of that colony, was re-engaged for Canada, and was assigned to the work at Montreal for 1900. His wide experience and thorough knowledge of the processes of making butter and cheese have enabled him to render further excellent service to these two important and growing industries.

CREAMERIES IN THE NORTH-WEST TERRITORIES.

The department has continued to manage the creameries in the North-west Territories. During 1900, butter was manufactured at 20 creameries ; and 15 cream-separating or cream-collecting stations tributary to those were also under the charge of the department. A charge of 4 cents per pound for manufacturing was made. In cases where loans had been made to the manufacturing association, an additional charge of 1 cent per pound was made for a loan fund. The total quantity of butter manufactured from May 1 to October 31 was 636,998 pounds.

Two of the creameries in Alberta were continued in operation during the winter of 1898-9, and four of them were continued during the winter of 1899-1900, and three are to be continued during the winter of 1900-1901.

The butter-makers at most of the creameries in Alberta and Assiniboia report that there are good prospects for an increase in the output of butter from them next season.

GENERAL DAIRYING SERVICE IN THE PROVINCES.

The following paragraphs indicate the other principal work which was carried on during the year in the different provinces.

In the province of Quebec, the Assistant Dairy Commissioner held meetings during the year ; and during the winter he delivered a series of lectures to each class of students at the dairy school of St. Hyacinthe.

In the province of Nova Scotia a dairy station was conducted at Nappan. Cheese has been made there during part of the summer, and butter during the winter.

The Dairy Superintendent of Nova Scotia has travelled throughout the province, visiting cheese factories and creameries and addressing meetings of farmers at various points.

He also assisted in carrying on the dairy school at Sussex, N.B., and addressed meetings in other places in New Brunswick.

The department has withdrawn entirely from the management of the dairy stations in Prince Edward Island. I am informed that the cheese factories and creameries on the island which had been under the management of this department, are now conducted by the directors of the several dairying companies with economy, efficiency and success.

It is reported that about 60,000 boxes of cheese were exported from the island for the season of 1900. The winter butter-making movement has been extended ; and I am informed that at many factories in Prince Edward Island winter butter-making was carried on during the winter of 1899-1900. This shows a rapid development of co-operative dairying in that province from 1892, when there was but one factory taken charge of by the department.

The development of mining in British Columbia and in the Klondike region is opening new and profitable markets for butter and other dairy products from British Columbia and the North-west Territories.

In the province of Ontario, New Brunswick and Manitoba, superintendents of dairying are employed by the provincial governments, and consequently no work of direct instruction, except the attendance at conventions, and the distribution of bulletins and reports from this department was undertaken in them.

BRANDING AND REGISTRATION BILL.

Under the Act passed 'to provide for the Registration of Cheese Factories and Creameries, and the Branding of Dairy Products, and to prohibit misrepresentation as to the dates of Manufacture of such Products,' certificates of registration have been issued to 1,057 cheese factories and creameries, and applications are being received occasionally.

EXPORTS OF BUTTER AND CHEESE.

The magnitude and growth of the export trade of Canada in dairy products is shown by the following tables (years ended June 30) :—

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

Year.	Quantity.	Value	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1869	10,649,733	1,698,042	534,707	1,015,702	....	1,496	14,870	95,777	26,989
1880	18,535,362	3,058,069	2,756,064	111,158	....	....	24,710	163,290	2,647
1881	17,649,491	3,573,034	3,333,419	58,522	....	....	30,574	143,935	6,584
1882	15,161,839	2,936,150	2,195,127	529,169	....	....	32,052	169,270	10,538
1883	8,106,447	1,705,817	1,330,585	206,154	....	....	29,446	131,341	8,291
1884	8,075,537	1,612,481	1,395,652	46,618	....	....	16,455	151,224	2,532
1885	7,330,788	1,430,905	1,212,768	16,695	....	15,172	21,473	161,862	2,835
1886	4,668,741	832,355	652,863	17,545	....	....	17,577	142,485	1,885
1887	5,485,509	979,126	757,261	17,207	....	....	23,789	180,238	631
1888	4,415,381	798,673	614,214	13,468	....	....	5,226	164,329	1,431
1889	1,780,765	331,958	174,027	7,879	....	....	22,921	124,349	2,782
1890	1,951,585	340,131	184,105	5,059	....	....	29,342	119,989	1,636
1891	3,768,101	602,175	440,060	10,054	....	20,447	24,021	101,649	5,944
1892	5,736,696	1,056,058	877,455	6,038	....	5,160	27,207	133,770	6,428
1893	7,036,013	1,296,814	1,118,614	7,539	....	1,175	35,042	127,412	7,032
1894	5,534,621	1,095,588	936,422	6,048	1,125	....	25,560	109,263	14,170
1895	3,650,258	697,476	536,797	5,365	....	267	35,028	108,439	11,580
1896	5,889,241	1,052,089	893,053	2,729	....	9,370	34,299	105,472	7,166
1897	11,453,351	2,089,173	1,912,389	6,233	....	8,513	33,490	115,754	12,794
1898	11,253,787	2,046,686	1,915,550	3,738	....	17,574	31,619	51,045	27,160
1899	20,139,195	3,700,873	3,526,007	3,984	....	12,384	41,810	74,813	41,875
1900	25,259,737	5,122,156	4,947,000	5,044	....	7,210	43,176	66,069	53,657

CHEESE.

Year.	Quantity.	Value.	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1868	6,141,570	620,543	548,574	68,784	....	....	891	1,954	340
1880	40,368,678	3,893,366	3,772,769	114,507	....	....	170	5,710	210
1881	49,255,523	5,510,443	5,471,362	28,500	....	....	14	10,027	540
1882	50,807,049	5,500,868	5,571,076	18,436	....	....	242	8,196	2,318
1883	58,041,387	6,451,870	6,409,859	24,468	....	....	202	15,490	1,863
1884	69,755,423	7,251,989	7,207,428	24,866	....	....	188	19,248	262
1885	79,655,367	8,265,240	8,178,953	86,978	....	....	205	15,899	1,207
1886	78,112,927	6,754,626	6,729,134	15,478	80	90	156	9,139	546
1887	73,604,448	7,108,978	7,065,983	30,667	....	....	211	11,982	165
1888	84,173,267	8,928,242	8,834,997	83,153	5	....	828	9,087	172
1889	88,534,887	8,915,684	8,871,205	31,473	....	....	1,582	11,208	216
1890	94,260,187	9,372,212	9,349,731	6,425	....	370	2,154	12,777	755
1891	106,202,140	9,508,800	9,481,373	13,485	....	....	1,954	9,104	3,884
1892	118,270,052	11,652,412	11,593,690	39,558	2	....	2,124	12,942	4,096
1893	133,946,365	13,407,470	13,360,237	23,578	....	....	2,689	18,679	2,297
1894	154,977,480	15,488,191	15,439,198	9,552	....	173	3,036	21,948	14,284
1895	146,004,650	14,253,002	14,220,505	5,058	....	16	5,463	9,785	12,175
1896	164,689,123	13,956,571	13,924,672	10,359	299	....	4,861	7,509	8,871
1897	164,220,699	14,676,239	14,645,859	4,486	94	24	5,365	11,954	8,457
1898	196,703,323	17,572,763	17,522,681	14,604	....	1,428	6,889	12,784	14,377
1899	189,827,839	16,776,765	16,718,418	17,739	....	....	11,701	13,293	15,614
1900	185,984,430	19,856,324	19,812,670	4,836	....	....	8,774	16,651	13,393

IMPORTS OF GREAT BRITAIN.

The following table from the Board of Trade returns of Great Britain for thirteen years (ended December 31), shows the total quantities and value of butter and cheese imported into Great Britain :—

BUTTER.			CHEESE.		
Year.	Quantity.	Value.	Year.	Quantity.	Value.
	*Cwt.	£ stg.		*Cwt.	£ stg.
1886	1,543,566	8,141,438	1886	1,734,890	3,871,359
1887	1,513,134	8,010,274	1887	1,836,789	4,514,382
1888	1,671,433	8,913,045	1888	1,917,616	4,546,408
1889	1,927,842	10,244,636	1889	1,907,999	4,490,970
1890	2,027,718	10,598,848	1890	2,144,074	4,975,134
1891	2,135,607	11,591,181	1891	2,041,317	4,815,369
1892	2,183,009	11,965,190	1892	2,232,817	5,416,784
1893	2,327,474	12,753,593	1893	2,007,462	5,160,918
1894	2,574,835	13,456,699	1894	2,226,145	5,474,940
1895	2,825,662	14,245,230	1895	2,133,819	4,675,130
1896	3,037,718	15,344,364	1896	2,244,525	4,900,342
1897	3,217,802	15,916,917	1897	2,603,178	5,885,521
1898	3,209,153	15,961,783	1898	2,339,452	4,970,805
1899	3,389,851	17,213,516	1899	2,384,069	5,503,004

*Cwt. = 112 lbs.

CROPS.

In most of the provinces of the Dominion farmers have realized during the past year good returns for their labour. In some localities, however, particularly in parts of the North-west country, the season has been less favourable.

In the maritime provinces the spring was very backward, so that seeding in a general way was delayed until after the middle of May. Nevertheless, the crops have turned out well, the yield of oats is exceptionally heavy, spring wheat and barley have also done unusually well. Pease have scarcely given an average crop, but Indian corn has made good returns. Field roots and potatoes have given unusually heavy crops. Hay was a fair crop, of good quality, and was well saved.

Fruit in the Annapolis valley and in other parts of Nova Scotia, also in some sections of New Brunswick and Prince Edward Island, turned out well. The home markets have been well supplied, and large shipments of apples have been made from Nova Scotia to Great Britain.

In Quebec the hay crop is said to be below the average, but of excellent quality. Oats have given more than an average yield. Spring wheat has also done well, while barley, buckwheat and pease have given fair returns. The harvest weather has been favourable. Field roots and potatoes have produced abundantly. Indian corn has given fair returns, and pasturage, especially during the latter part of the season, has been good.

In the south-eastern part of the province fruit has yielded well, and in the newer settlements in the north-western section of Quebec excellent crops have been had.

The farmers of Ontario have had good crops. Fall wheat, of which there was a larger acreage than usual, has given more than an average return. Spring wheat, barley and oats have all given crops considerably larger than the average of past years. These have been well saved, but the straw, owing to dry weather in the spring, is unusually short. Pease and beans have also gone above the average in yield. Rye has givn a fair return, while buckwheat has fallen below the average. Field roots have given good crops, averaging higher than last year. The crop of Indian corn has been a medium one, while hay, owing to a drought in the spring, has given less than the usual return. Potatoes have given the largest yield had in many years.

The crop of fruit has been unusually good. Small fruits were abundant, peaches and grapes unusually plentiful; pears and plums a fair crop, and apples an abundant one.

In the province of Manitoba a severe drought prevailed during the spring months, which interfered with the prompt germination of seed. Early in August, when the grain was nearly ripe, wet weather set in and interfered with harvesting for some weeks, and in some cases causing the grain to sprout. In many instances the outcome has been disappointing, an inferior crop, with but a small proportion of wheat of high grade. The hay crop, owing to spring drought, was very light, but the later rains produced a heavy aftermath, giving abundant pasture. Late maturing grain crops were very heavy, but many of them were not fully ripe when frost came. Such oats and barley as escaped injury from bad weather gave good crops, but of other varieties the returns are light.

Indian corn gave a good yield, while field roots gave about half the usual returns. The potato crop was a satisfactory one, and above the average.

In the North-west Territories the season was also unfavourable. Like Manitoba, the Territories suffered from drought in the early part of the season, and later on from too much rain. There was very little rain in the early part of the year, and strong winds injured the crops and such grains as escaped injury from wind, ripened with very short straw. When the grain was about fully ripe there were frequent rains, which protracted the harvest season and made it more laborious and expensive than usual. Grain sown later to replace exposed portions of fields injured by winds produced a very heavy growth of straw, but the grain, in some instances, did not mature. The sheaves, however, cut, will make excellent food for stock.

In some limited sections the conditions were much more favourable, and fair crops of grain were realized. Barley as a rule was less injured than wheat. Indian corn was a fair crop. Field roots gave less than an average return, but potatoes were an excellent crop, giving large yields of tubers of fine quality. The hay crop was a light one, but the later rains produced great growth, and the pastures were excellent. Trees and shrubs and flowers made an unusually strong and vigorous growth. Stock in every part of the Territories has done remarkably well during the past season.

Farmers in the coast climate of British Columbia have as a rule had fair crops of oats, barley and wheat, in many instances well up to the average. Pease also were a medium crop, while Indian corn gave more than an average return. The early part of the spring season was cold and wet, and the seeds of field roots did not germinate evenly, but those which were earliest sown have given very fair returns, and in some instances the crop has been heavy. Potatoes have given good yields, well up to the average. Cut worms have been unusually abundant, not only in the coast climate, but also in the interior of British Columbia, and in the adjoining states of Washington and Oregon. They injured the grain to some extent, and devoured some of the growing fruit.

Grain in the interior of British Columbia has given satisfactory returns; the crops of fruit have also averaged well. Fruit in the coast climate promised well early in the season, but cut worms and protracted wet weather during the ripening period reduced the yield considerably. Hay has given an excellent return, and small fruits have yielded well.

CATTLE TRADE

FOR YEAR ENDED SEPTEMBER 30.

IMPORTATION OF LIVE STOCK.

The importation of horses and mules, cattle, sheep and swine into the Dominion reported during the past season was as follows :—

Horses and mules	11,755
Cattle	2,834
Sheep	46,170
Swine	1,584

The above were brought in at various points as shown in detail in the reports of the Chief Veterinary Inspector (See Appendix No. 13).

EXPORTATION OF LIVE STOCK TO EUROPE.

The exportation of live stock from Canadian ports for the year ended September 30, 1900, was as follows :—

Horses	5,044
Cattle	115,056
Sheep	79,254
Swine	Nil.

EXPORTATION OF CATTLE TO THE UNITED STATES.

The numbers of Canadian cattle exported to the United States during the four previous years, were as follows :—

1896	1,646
1897	57,857
1898	88,605
1899	85,240
1900	86,989

EXPERIMENTAL FARMS BRANCH.

The many branches of useful experimental work conducted so successfully at the Central and branch farms have been vigorously carried on during the past year, and much general information has been disseminated among the farmers of this country, The increasing demand for the reports and bulletins published by the farms, and the many individual inquiries by letter for information on farm subjects, indicate an appreciation of the work and a desire to profit thereby. The services of the several officers have been much in demand, and many of the more important agricultural and horticultural meetings have been attended in different parts of the Dominion, every province and territory being more or less visited.

AGRICULTURE—EXPERIMENTAL DIVISION.

TESTING OF FERTILIZERS.

The researches in connection with this division of the work have been pushed forward with much energy. The testing of the action of fertilizers on crops has been continued and many new experiments inaugurated. Further evidence is forthcoming to establish the economy of using barn-yard manure in its fresh or green state as a fertilizer, and additional demonstrations have been made as to the great usefulness of green clover when ploughed under, adding fertility to the soil, improving its texture and mechanical condition, and increasing its power to hold moisture. The practice carried out at the farms of sowing clover with spring grain crops, and ploughing the crop under late in the autumn, is rapidly growing in favour with the farming community, and is being adopted in many cases with the best results.

EXPERIMENTS WITH FARM CROPS.

Further trials have been made to test the relative earliness and productiveness of a large number of varieties of the more important farm crops, and some promising new sorts have been introduced, including several which have lately come into cultivation in Great Britain, and some additional cross-bred sorts which have been produced at the experimental farms. As soon as the particulars of the crop could be ascertained, a special bulletin was issued which was distributed widely among the farmers of the Dominion, and the information gained was thus placed in their hands in good season.

Under my instructions the Director of Experimental Farms visited the Paris Exposition during the summer, and examined the agricultural exhibits of other countries with the object of obtaining promising sorts of farm products for test in Canada. In this he has been successful, and samples of a number of varieties not hitherto tried here have been secured, particularly of wheat, oats, barley and rye, from the exhibits made by Russia, France, Sweden, Algeria and Roumania. These will be included in the test plots next season. The Director also visited agricultural colleges and experiment stations in Great Britain and France, where he gained much information and secured further supplies of interesting agricultural and horticultural material for testing on the experimental farms here.

DISTRIBUTION OF SEED GRAIN, &c.

The interest manifested by the farming community in the past in the annual distribution of samples of promising varieties of seed grain is unabated, and the demand for such material for the improvement of seed has been large. Under my instructions such arrangements were made as resulted in supplying sample bags to all those who applied before March 15, which was the limit of the time given during which applications would be received. The varieties which have been sent out are mainly those which have shown the greatest vigour and productiveness in the comparative trials which have been made at the experimental farms.

The new feature introduced in connection with this distribution, referred to in my last annual report—that of sending to a limited number of the most careful farmers residing in different parts of the Dominion a sufficient quantity of seed to sow one-tenth of an acre of land has worked well. The farmers who were selected to carry out this work have taken much interest in the subject, and have in most instances compiled, and returned the particulars asked for, with much promptness. By this means, useful information has been gained as to the relative yield per acre in all the climates of the Dominion, of the special sorts sent out. Arrangements are being made to have this section of the work continued.

HARDY FRUIT, FOREST TREES AND SHRUBS FOR THE NORTH-WEST PLAINS.

Packages of root grafts of some of the most promising of the new cross-bred hardy crabs, which have been produced at the Central Farm during the past few years, were distributed last spring to the branch Experimental Farms, also to about forty farmers and fruit growers living in different parts of the north-west country.

Although the severe spring drought which prevailed there this year was unfavourable for the growth of the young trees, a considerable measure of success has attended this effort. Preparations are being made for another limited distribution of this sort during the coming season. Such additional varieties of hardy trees and shrubs as were obtainable have been sent to the branch farms at Brandon and Indian Head, to be thoroughly tested as to their useful qualities in those districts. The direct and striking evidence which was afforded this year, especially at Indian Head, of the usefulness of such forest tree plantations as shelter belts and hedges in protecting grain crops from the destructive action of strong winds, was very gratifying. Farmers are gradually being led by the many object lessons given them to pay more attention to the importance of providing more tree shelter on their prairie farms.

GENERAL AGRICULTURE.

The 200 acres of land on the Central Experimental Farm, which was referred to in my report last year as having been set apart for a regular rotation of crops, has been worked this year to more advantage. The land has been much improved by enlarging and extending the system of drainage, which was much needed. Additional fencing has also been provided to permit of the stock being pastured in different parts of the land each year. Particulars of the crops obtained, and the cost of growing them, will be found in the report of the agriculturist of the Central Farm for 1900.

DAIRY WORK.

The dairy herd of cattle has been further improved by the addition of several pure-bred animals. Some experimental work has also been carried on in reference to the influence which the use of certain foods have on the proportion of butter fat in the milk.

STEERS.

Further experiments have been conducted to gain information as to the most economical methods of feeding steers, also as to the influence which the operation of dehorning has on the fattening of the animal.

SHEEP.

The flock of sheep has been considerably increased, and experimental work is being continued to gain information as to the influence of pure-bred sires on grade ewes in improving the stock.

SWINE.

Many experiments have been made in connection with the feeding of swine with the object of finding the cause of soft bacon, also to determine the rapidity of the growth of the animal under different rations. The breeding stock has also been much improved by the purchase of additional pure-bred animals of the best types.

DIVISION OF HORTICULTURE.

The chief work of the Horticultural Division is the testing of fruits to determine their relative hardiness, quality, productiveness and freedom from disease. In conjunction with this work, however, different ways of propagating and grafting fruits are tried, and different methods of cultivation adopted in the orchards. Much work has also been done to determine the best cover crops to protect the roots of the trees in winter, and to improve the soil when ploughed under. The spraying of the trees also receives attention. In addition to the work carried on with fruits, considerable time is devoted to the testing of vegetables and tobacco. The Arboretum and Botanic Garden and the forests are also included in the Horticultural Division.

Fruits.—The year 1900 was a good fruit year at the Central Experimental Farm. A large number of varieties of apples, plums and strawberries fruited which had not done so before, affording material for studying their relative merits. Every year's experience makes the experiments with the different fruits more valuable, as the average results will be a better guide to the real value of the varieties tested. Few varieties of winter dessert apples are hardy at Ottawa when grown from root grafts in the ordinary way, as the trunks either sun-scald or the roots are killed by winter. Experiments were continued this year in the top grafting of a large number of these tenderer varieties on trees which are perfectly hardy at Ottawa, and the results so far justify the conclusion that some varieties, at least, can be grown here successfully in that way which might otherwise prove tender. Much attention has been given to the cultivation of the American plums, and a large number of improved varieties of these are now being grown. Few varieties of European plums are hardy at Ottawa, and as some of the American sorts are of good quality and nearly all quite hardy, they will be very useful in districts where the European plums cannot be grown. A large number of new varieties were added to the collection this year.

Vegetables.—While more attention is paid to the testing of fruits, vegetables are not neglected. They form an important article of diet, and the growing of them gives a means of livelihood to many, therefore, information regarding their season, quality, productiveness, &c., should prove useful. A large number of varieties were again tested this year, and many notes taken on their relative merits and productiveness.

Cover Crops.—The importance of growing cover crops in orchards is becoming more apparent every year. The disastrous results of the winter of 1898-99, in the destruction of trees from root-killing, in fruit districts in south-western Ontario, impressed on fruit growers the need of more protection for the roots of fruit trees in winter. Since 1895, much attention has been given to cover crops at the Central Experimental Farm. Different kinds of plants have been tried for this purpose, and different ways of treating them have been followed. Common Red or Mammoth clover make the best cover crops where they can be grown successfully. The trees in the orchard at the farm are well protected with clover this autumn.

Spraying.—Thorough spraying of the fruit trees was continued this year, and the good results were apparent. Experiments were continued this season in testing the value of a spray of lime and water in removing the oyster-shell bark-louse from apple trees. Additional evidence was obtained of the value of the mixture for this purpose. The value of a lime wash as a remedy for this destructive insect was first discovered by the horticulturist of the Central Experimental Farm.

Arboretum and Botanic Garden.—The trees, shrubs and herbaceous plants in the arboretum made very satisfactory growth this year, owing to the favourable season. Many additions were made to the collections, which are now very large. The value of this branch of the work of the Horticultural Division is becoming more apparent every year, as a better knowledge is obtained of what can be grown successfully in this part of Canada.

DIVISION OF ENTOMOLOGY AND BOTANY.

The services of the Entomologist and Botanist during the past season have been in constant demand, and he and his assistants have been kept busy in the carrying out of many experiments connected with the life histories of injurious and beneficial insects, and the nature of weeds and other plants. The increased demand for information from the division is very satisfactory, and is attested by the large number of inquiries received; without counting circulars and personal applications, 3,017 letters demanding replies came to hand during the year. Considerable progress has been made in arranging the collections of plants and insects. Specimens which have been on hand for several years have been mounted and put in place for exhibition in the additional room which has been put at the disposal of this division. Some cases showing the complete life histories, in all stages, of several insects, have been prepared, as well as a collection of beautifully inflated caterpillars, presenting them in a permanent shape, showing their form and colours as in life. These collections are now an attractive feature to students and visitors, and will become more so as further additions are made.

Among the insects which have demanded special attention during the season are the following :—

The San José Scale.—The establishment of Fumigation Stations for the treatment of nursery stock so as to prevent any further introduction of the San José Scale into Canada was placed in charge of the Entomologist, and has taken up some time. Unfortunately it would appear as though the San José Scale has increased in numbers in the districts which were known to be infested last year, and the pest has spread somewhat into adjacent localities. Several experiments are being tried in the hope of getting a practical remedy.

The Hessian Fly.—A serious outbreak of the Hessian Fly has to be recorded in Western Ontario, but in Manitoba where last year the summer brood destroyed a very large percentage, in some places amounting to one-quarter of the crop, of spring wheat, hardly any injury is reported this year.

Locusts.—An outbreak of locusts following a very dry spring was the cause of serious loss in Southern Manitoba in June last. The Entomologist, under my instructions, visited the worst localities in company with the Chief Clerk of the Department of Agriculture, Manitoba, and advised farmers as to the best steps to follow.

The Variegated Cut-worm.—The caterpillar of one of the owl-let moths, named *Peridroma saucia* did enormous harm throughout the province of British Columbia in July and August last, extending over the whole of the coast districts, up through the interior, even high up into the mountains, in fact wherever there were cultivated crops. Prompt advice was at once sent from the division and widely distributed by the Deputy Minister of Agriculture for British Columbia.

The Spotted Cut-worm, *Noctua C-nigrum*, a closely allied insect was also abundant about the same time in Ontario destroying all classes of succulent crops.

The pea crop was assailed by three destructive enemies, the Pea Weevil which year by year is the cause of a great loss to the country, notwithstanding the fact that a practical remedy is well known. The Entomologist has endeavoured to stir up farmers to adopt the simple remedy of fumigation with carbon bisulphide to a much larger extent than has been done in the past. The pea moth has been more abundant than usual in Quebec and Ontario. Experiments are being tried for a practical remedy, and rather hopeful results have been obtained, which will be further investigated next year. The Destructive Pea-Aphis which was treated of in the last report of the Entomologist has again appeared this year on pease and clover. Although the injury has not been quite so extensive in Canada as last year, the destruction in the United States by this pest has been enormous.

The investigations as to the value of native grasses and other fodder crops have been continued, also studies of noxious weeds and the comparative value of various remedies for injurious insects.

During the Director's absence attending the Paris Exposition, it became necessary for the Entomologist, as the next senior officer, to act as Director, which necessarily increased to a considerable extent the work of himself and his assistants.

Several meetings have been attended and addresses delivered upon the best methods of preventing or meeting insect injuries, upon weeds and their eradication, as well as upon other matters coming within the scope of the Division of the Entomologist and Botanist. During the month of July at the request of the government of the North-west Territories the Entomologist held a series of twelve meetings in the Prince Albert district, where addresses were delivered upon weeds and kindred subjects.

DIVISION OF CHEMISTRY.

Since chemical aid is needed in every branch of agriculture, the work of this division necessarily covers a very wide field. Though original investigations and research work in connection with experiments instituted at the Experimental Farms have received first attention, a very large amount of direct and immediate help has been given to farmers by means of correspondence, analysis of samples, and by lectures.

The chief features of the work for 1900 may be enumerated as follows:—

Soils.—Complete analyses of soils from irrigated and non-irrigated areas in the North-west Territories have been made, and the results of this investigation will appear in the forthcoming report of the Chemist. The question involved is whether irrigation increases or diminishes fertility, or, to speak more correctly, the amount of plant food, and the data obtained will furnish some interesting information towards the solution of that problem.

Samples, also from the North-west Territories, of virgin prairie soil and soil from a closely adjacent area which had been cropped for a number of years, but not manured, have been critically examined. This research was undertaken to learn the extent to which the rich soils of the North-west may become impoverished by the common method of continuous cropping without manuring.

The soil and sub-soil representative of the larger part of the area lying between the Fraser river and Burrard inlet, B.C., have been examined with a view to learning their characteristics and deficiencies, and thus be in a position to assist the farmers and fruit growers settled there by suggestion as to the most profitable fertilizers to use.

The question of the conservation of soil moisture, as affecting the lands of Manitoba and the North-west Territories, has been the subject of an extensive investigation carried on through assistance rendered by the Superintendents of the Experimental Farms of those provinces month by month from May to November, the amounts of water have been determined, by analysis, in the surface soil and subsoil of cropped and fallowed land, respectively, and most instructive and interesting data have been obtained. The conservation of soil moisture by cultural methods is a question of the utmost importance to agriculturists in the North-west.

A study of the development of the nitrates in these North-western soils has also been made. This was instituted to learn how far the statement that loss of nitrates occurred through leaching was correct.

Though valuable results have been arrived at, in these soil studies, it will be necessary to continue the prosecution of many of them over several summers, in order to ascertain the effect of varying seasons.

Fodders and Feeding Stuffs.—The growing importance of rape as a fodder crop made it desirable that we should know at what stage of growth it is most nutritious. Accordingly, this plant has been submitted to analysis at periods of growth, varying from 10 to 100 days.

A number of newly introduced legumes grown at the Central Farm under the care of the Botanist have been analysed, and their nutritive value ascertained. They include the famous Lathryus sylvestris Wagneri, Canada Wild Pea, Grass Pea and others.

Numerous feeding stuffs, among which are samples of cotton seed meal, bran, cocoanut cake, have also been examined and reported upon.

Many of the more popular varieties of mangels, carrots, turnips and sugar beets have been analysed and their relative feeding value established, furnishing useful information for the guidance of stock feeders.

Naturally-occurring Fertilizers.—Samples of marl, muck and naturally-occurring substances having a manurial value, and collected in various parts of the Dominion, have been examined.

Well Waters.—This work has been continued, and about seventy-five samples from farm homesteads and dairies have been tested during the past year.

Soft Pork Investigation.—A very large portion of the time of the Chemical staff has been spent on this useful and important research. The fatty tissue of more than

200 pigs, fed in pens of six to ten animals, with various rations, has been submitted to a careful chemical examination. This investigation is still in progress, but already results of the greatest value, as showing the effect of different feeding stuffs on the quality of the pork, have been obtained. Since the bacon export trade to England is rapidly increasing, and since the English market demands a 'firm' bacon, the importance of this investigation is obvious.

Sugar Beets.—Analyses, as to sugar-content and purity, have been made of sugar beets grown in Manitoba, North-west Territories and Prince Edward Island. This investigation was undertaken to supplement the data already obtained in the farm laboratories on sugar beet culture in Canada.

The analytical data referred to in connection with the foregoing investigations, together with the deductions therefrom, will be found in the report of the Chemist of the Experimental Farms for the current year.

Tuberculin.—During the twelve months ending October 31, 1900, 20,280 doses of tuberculin have been prepared and forwarded by this division to the Government Veterinary Inspectors. In the preceding year for the same period 17,179 doses had been sent out.

POULTRY DIVISION.

In the poultry department experiments were conducted during the winter in the feeding of certain rations and noting their effect on egg production during that period. Investigation into the drawbacks to early successful spring hatching by natural and artificial means was also made, and in connection therewith the effect, on the laying stock, of their artificial life and treatment during the cold period from December to April. Experiments were also conducted in the fattening of a number of thoroughbred and half-bred cockerels. The data obtained showed that the best results were obtained in from three to four weeks, and that while some crosses did well, that best results were obtained from thoroughbreds of the larger breeds.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

The experimental work in progress for some years past has been continued with a large number of varieties of different sorts of farm products, including the more important cereals, field roots and fodder crops, to ascertain which of these produce the heaviest crops. Many samples of the seed of the most promising varieties grown at the Nappan farm have been sent out for test to farmers residing in different parts of the Maritime provinces.

The excellent dairy herd which has been brought together here has been well maintained. It now consists chiefly of pure bred Ayrshires and Guernseys and Ayrshire grades, accounts are kept of the cost of feeding these animals and of the revenue derived from the sales of milk, which are published from year to year in the report of the Superintendent. Many steers have also been fed to determine the cost of the production of beef with the rations used, also as to the effects of dehorning steers. Additional experiments have been made to gain information as to the most economical methods of producing pork.

Further trials have also been had with fruits and vegetables to find out what sorts are best adapted to the climate of the Maritime provinces, also to determine the quality and usefulness of the different sorts under trial.

Additions and improvements have been made to some of the farm buildings: A new horse stable has been erected, and the former stable refitted. A part of it has been devoted to increased accommodation for steers and part of it to sheep. An additional root-house has also been provided.

Many meetings of farmers have been attended during the year by the Superintendent and Horticulturist, in Nova Scotia, New Brunswick and Prince Edward Island, when fuller explanations have been given of the work being done at the Nappan Experimental Farm.

EXPERIMENTAL FARM FOR MANITOBA.

This farm continues to be very helpful to the settlers in Manitoba, and stands high in the favour of the community. A large number of farmers visit this institution every year to gain instruction from the object lessons afforded there. The Superintendent also attends many meetings of farmers during the winter months, when opportunities are given of explaining more fully the various lines of work in progress.

Further trials have been made at this farm of different methods of cultivation for crops, and a large number of experiments conducted with different varieties of the more important farm crops, with the view of finding out which are the most profitable sorts to grow in this climate. Many experiments have also been made with grasses suitable for hay and pasture.

Experiments have also been conducted with rye, flax, millets, soja beans, garden vegetables and with many different sorts of rhubarb. Fruits also of many kinds have been further tested, and on all these subjects much useful information has been gained.

Some experiments have been made in the feeding of swine, also in the fattening of steers to ascertain the most economical methods of using the various kinds of fodder grown in Manitoba. Tests have also been made of the effects of the dehorning of steers. Experiments in the fattening of poultry have been continued, planned to meet the conditions of the average Manitoba farmer. The care of bees in this climate has also been the subject of further study and experiment.

The rapid growth of the forest trees on this farm, planted in windbreaks, avenues and hedges, adds very much to its attractiveness, and is proving a great incentive to tree planting for shelter on the farms of that province. Some promising sorts of young forest trees and shrubs have been distributed for test among the farmers of Manitoba, many samples of promising sorts of grain and potatoes have also been sent out for trial.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

The good work conducted for some years past in testing all sorts of agricultural products, likely to prove useful in the North-west country, has been continued. The season has been unfavourable for some of these crops, while others have done fairly well. Much attention has been given at this farm for many years to experiments in the summer-fallowing of land to find out the best method for the treatment of the land, to secure the most satisfactory results. This is a most important subject to farmers in the North-west country. During the past year some conclusions have been reached, based on the long experience had on the Experimental Farm, as to the best methods to adopt, the particulars of which will appear in the report of the superintendent for 1900. Experiments with different plans for a rotation of crops have been continued.

Experiments have been carried on with the dehorning of steers to ascertain what effect this operation has on the feeding of these animals in the North-west country.

Many samples of the most promising sorts of grain grown in the Experimental Farm have been distributed among the settlers in the Territories for trial. A considerable distribution has also been made of sample bags of the seed of Brome grass, also of tree seeds and many packages of young trees and shrubs have been sent for trial to different parts of the country. Further experience has been had with trials of many different sorts of vegetables, also with such ornamental trees, shrubs and plants as are likely to prove hardy in that country.

The cattle on this farm which consists chiefly of Shorthorns and Shorthorn and Ayrshire grades are all in good condition. The bulls kept for service are Shorthorn, Ayrshire and Guernsey. These have been found very useful to farmers in that part of the country for the improvement of their stock.

During the year the Superintendent has visited many parts of the Territories, has attended and addressed meetings of farmers, and has thus become more fully acquainted with the needs of the settlers in different parts of the immense area comprised in the North-west Territories.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

The work on this farm is making satisfactory progress. A considerable acreage of land has been chopped and brushed during the year, and the clearing on a good portion completed and the land brought under the plough. Arrangements made by me last year for the opening of surface drains from the lower parts of the land on this farm into a public ditch has worked satisfactorily; a large quantity of surface water has been removed, which will permit of nearly all that part of the farm being eventually brought under cultivation.

The fine orchards of fruit, which are a special feature of the work here, are making excellent progress. The trees are growing rapidly and many of the varieties coming into fruit. As these different sorts come into bearing, descriptions are taken as to the character and quality of the fruit, the particulars of which are published from year to year in the reports of the Superintendent. During the past year a complete list has been published of all the varieties of large fruits which are now under trial at Agassiz, numbering 2,582 varieties in all. In this publication descriptions are given of the character and quality of all the different sorts which have borne fruit at Agassiz. These lists have been distributed among the settlers and will no doubt be very useful to those who are making new plantations of fruit trees.

The orchards planted on the sides of the mountain in rear of the farm are doing remarkably well, the trees are making a rapid and healthy growth, and many of them are coming into bearing.

Further experience has been gained by continuation of experiments with many different varieties of wheat and oats, also of barley, pease, Indian corn, field roots and potatoes, also with grasses and clovers, flax, millets, soja beans, horse beans. Many garden vegetables have been tested, and the particulars recorded by the superintendent in his yearly report. These records have proved a useful guide to many of the settlers in that province.

Many meetings of farmers and fruit growers have been attended during the year by the Superintendent of the Farm, where opportunities have been afforded of explaining more fully the details of the many important lines of work in progress.

ARCHIVES.

The work of this branch continues to be carried on systematically and with strict regard to economy. Many of the papers summarized in the calendar of this year's report show the incidents that preceded the political disturbances in Lower and Upper Canada, headed in the one case by Mr. L. J. Papineau and in the other by Mr. W. L. MacKenzie.

III.—PATENTS OF INVENTION.

The following comparative tables show the transactions of the Patent Branch of the Department of Agriculture, from the calendar year 1888, to the year ending October 31, 1900 :—

Years.	Applications for Patents.	Patents and Certificates Granted.			Caveats.	Assignments of Patents.
		Patents.	Certificates.	Total.		
1888	2,747	2,257	282	2,539	240	1,159
1889	3,279	2,725	356	3,081	221	1,437
1890	3,560	2,428	369	2,797	248	1,307
1891	3,233	2,343	393	2,736	215	1,231
1892	3,176	3,417	415	3,832	242	1,500
*1893	2,614	3,153	292	3,445	229	1,345
1894	3,291	2,756	462	3,218	301	1,445
1895	3,387	3,074	422	3,496	343	1,550
1896	3,728	3,488	413	3,901	306	1,420
1897	4,300	4,013	284	4,297	377	1,551
1898	4,200	3,611	262	3,873	363	1,657
1899	4,305	3,151	412	3,563	311	1,467
1900	4,628	4,522	482	5,004	283	1,914

* For 10 months only.

DETAILED STATEMENT, Patent Office Fees.

Years.	Patents.		Assignments.		Caveats.		Copies.		Subscription to *Patent Record.*		Notices to Apply for Patent.		Sundries.		Totals.	
	$	cts.	$	cts.	$	cts.	$	cts.	$	cts.	$	cts.	$	cts.	$	cts.
1888	60,436	78	2,562	22	1,257	40	971	98	....		....		18	13	65,246	51
1889	72,411	30	3,027	90	1,205	47	1,267	60	....		....		134	45	78,046	72
1890	78,192	61	3,202	00	1,320	15	931	83	....		....		504	19	84,150	78
1891	72,664	26	2,411	95	1,124	60	782	29	....		....		340	53	77,723	63
1892	71,840	84	2,794	66	1,270	13	793	32	236	52	89	96	195	33	77,216	76
*1893	58,441	81	2,633	71	1,244	70	796	15	285	18	337	81	110	73	63,850	19
1894	73,061	77	3,142	74	1,793	40	764	07	347	21	1,449	80	123	57	80,682	56
1895	78,223	52	3,194	00	1,854	35	761	54	245	98	1,951	30	129	79	86,358	48
1896	85,060	61	3,130	56	1,790	65	898	27	420	60	2,245	79	57	04	93,532	52
1897	93,298	16	3,250	23	2,108	57	969	33	252	53	2,110	89	128	21	102,117	92
1898	91,176	44	3,641	00	1,935	74	706	50	266	44	1,463	10	172	73	99,361	95
1899	98,669	92	3,781	71	1,533	25	1,028	80	198	05	1,912	00	137	83	107,261	56
1900	104,848	96	4,255	40	1,405	00	932	54	552	71	1,742	70	115	15	113,852	46

* For 10 months only.

The Patent Office fees received during the year ended October 31, show a surplus of $68,284.65 over the working expenses of the office as per subjoined table.

Receipts.	$	cts.	Expenditure.	$	cts.
Cash received	113,852	46	Salaries	31,134	59
Cash refunded	2,520	88	*Patent Record*	11,912	34
				43,046	93
			Receipts over expenditure	68,284	65
Net cash	111,331	58		111,331	58

The following is a table of the countries of residence of the patentees for the years named :—

Countries.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Canada	565	609	620	606	671	685	661	707	740	756	710	601	707
England	152	203	116	122	298	206	177	179	215	266	261	205	254
United States	1,425	1,788	1,623	1,519	2,227	2,061	1,731	1,980	2,270	2,666	2,312	2,038	3,216
France	21	18	10	10	26	24	24	21	24	26	39	36	40
Germany	33	51	23	36	106	88	108	102	117	126	124	112	157
Other countries	61	56	36	50	89	89	55	85	122	173	165	159	148
Total	2,257	2,715	2,428	2,343	3,417	*3,153	2,756	3,074	3,488	4,013	3,611	3,151	4,522

The Canadian patentees were distributed among the provinces of the Dominion as follows :—

Provinces.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Ontario.......	354	383	425	394	464	437	404	451	430	464	383	310	396
Quebec	128	129	125	140	131	151	162	177	201	178	171	140	164
New Brunswick	19	22	20	16	19	23	13	13	12	20	26	7	14
Nova Scotia....	35	30	17	22	16	29	15	19	32	22	27	18	21
Prince Edward Island..	2	2	3	1	1	3	2	6	2	2	4	8	1
Manitoba and the North-west Territories....	18	32	14	28	22	26	38	18	28	36	45	50	42
B. Columbia....	9	11	16	5	18	16	27	23	35	34	54	48	69
Total..	565	609	620	606	671	*685	661	707	740	756	710	601	707

* For 10 months only.

Statement of the number of Patents issued under the Act of the session of 1892, 55-56 Vic., chap , 24, on which the fees are paid for periods of six, twelve or eighteen years, at the option of the patentee ; and of patents on which certificates of payments of fees were attached after the issue of Patents originally granted for periods of five and ten years.

Years.	Periods for which the Fees were paid on first issue.			Patents on which Certificates were attached after issue.			
	6 yrs.	12 yrs.	18 yrs.	6 yrs.	12 yrs.	5 yrs.	10 yrs.
1892 (Six months ended December 31)......	2,141	3	35	......	3	387	25
1893 (Ten months ended October 31).......	3,098	9	46	......	3	279	10
1894 (Twelve months ended October 31)....	2,701	9	46	......	4	433	25
1895 " "	3,049	5	20	......	....	416	6
1896 " "	3,443	11	34	2	....	401	10
1897 " "	3,981	8	24	15	3	262	4
1898 " "	3,586	3	22	176	9	77	0
1899 " " ...	3,125	3	23	291	13	108	0
1900 " "	4,489	4	29	366	21	101	0

It will be found in the preceding tables that the total revenue for the year is $113,852.46, being the largest in the history of this branch of the department, resulting in an increase of $6,590.90 over the preceding year and a surplus of $68,284.65 over the expenditure.

As in previous years, the larger proportion of applications for patents came from inventors resident in the United States, to whom were granted 3,216, over 71 per-centum of the whole issue.

The number of petitions under section 37 of The Patent Act, in which satisfactory reasons were shown to justify the granting of the importing privilege, was 1,276, and of the manufacturing privilege 2,966, or an increase over the preceding year of 205 and 562 respectively.

The total number of reports issued by the examiners during the year was 6,161.

It is in the interest of both the applicants and the office that great care should be taken by applicants in the preparation of the papers which are required by the rules and forms. Copies of these are furnished gratuitously to all applicants, and the directions in them should be closely observed.

Patentees who are resident in foreign countries continue to avail themselves of the privilege granted under section 8 of The Patent Act, by giving notice to the Commissioner of intention to apply for patents in Canada. The number of these notices registered during the year was 1,011, yielding a revenue of $2,022.

The 'Canadian Patent Office Record' continues to be published monthly. It contains a transcript, with drawings, of all claims of patents granted, dates of filing, dates of issue, and length of term for which granted; together with the names and residences of patentees. It also contains a list of registered copyrights, trade marks and designs. This publication is found to be of great and increasing value to all who are interested in patents. It affords convenient and easy reference to the claims of all patents granted in Canada, and thus enables both inventors and the public to see exactly what is patented. There is an increase over the preceding year in the revenue from this source of $354.66.

The custom still prevails in furnishing this official publication to foreign patent offices in exchange for their reports; and it is also sent, without charge, to a large number of free libraries in Canada and in foreign countries, with the object of diffusing in the public interest the information therein contained. The publication is also furnished at the rate of 20 cents per monthly number or $2 per annum, and back numbers in print are furnished at the same price.

Patentees under the instalment plan, who have paid fees for one or more partial terms of their patents, not infrequently postpone payment of the further fees required to keep their patents in force until after the date within which they are payable; consequenly the patents expire, and it is not in the power of the office to revive them. A revival can only be secured by a private act of parliament, the obtaining of which entails considerable expense to the patentee. The attention of patentees and their solicitors is again called to the necessity of their making these payments in time.

IV.—COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

Month.	Trade Marks.	Copy-rights.	Designs.	Timber Marks.	Assign-ments.	Copies.	Total.
1899.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
November..	1,205 55	108 00	20 00	6 00	9 00	2 50	1,351 05
December.......... ...	1,505 25	118 00	45 00	6 50	23 00	9 00	1,706 75
1900.							
January.........	945 25	98 15	39 00	2 00	48 00	8 50	1,140 90
February	915 00	81 50	49 00	6 00	20 00	3 50	1,075 00
March	1,000 00	101 50	85 00	6 00	15 00	20 00	1,227 50
April...	892 25	91 00	48 00	. . . .	11 00	12 60	1,054 85
May	985 00	108 50	80 00	8 00	11 00	16 00	1,208 50
June	1,065 00	120 50	83 00	....	35 00	9 00	1,312 50
July	845 00	64 50	49 00	... .	11 00	12 60	982 10
August.......	906 75	65 50	56 00	6 00	21 00	11 00	1,066 25
September..	1,054 13	74 50	28 00	8 00	10 50	6 00	1,181 13
October....	1,296 00	80 00	54 00	9 00	26 00	11 00	1,476 00
	12,615 18	1,111 65	636 00	57 50	240 50	121 70	14,782 53

The following table shows a comparative statement of the business of this Division from 1887 to October 31, 1900, inclusive:—

Years.	Letters Received.	Letters Sent.	Copyrights Registered.	Certificates of Copyrights.	Trade Marks Registered.	Certificates of Trade Marks.	Industrial Designs Registered.	Certificates of Industrial Designs.	Timber Marks Registered.	Certificates of Timber Marks.	Assignments Registered.	Fees Received.
												$ cts.
1887	1,543	1,543	554	167	245	245	105	105	16	16	56	8,192 53
1888..	1,655	1,889	566	167	288	288	71	71	29	29	71	9,262 86
1889...	1,721	1,987	616	178	280	280	88	88	26	26	49	9,111 88
1890.......	1 766	2,169	688	222	293	293	68	68	21	21	104	9,876 38
1891.......	1,651	2,385	541	174	307	307	129	129	11	11	51	9,236 96
1892	1,773	2,300	536	159	294	294	30	30	27	27	66	9,496 29
1893........	1,432	2,070	475	126	257	257	41	41	19	19	55	8,013 33
1894...	1,882	2,720	546	216	311	311	39	39	20	20	77	9,463 63
1895	2,184	3,279	601	163	374	374	52	52	20	20	70	11,673 26
1896........	2,185	3,437	653	212	331	331	68	68	14	14	161	10,579 54
1897.......	2,606	3,548	756	273	446	446	75	75	13	13	94	14,101 93
1898	2,576	3,453	734	275	423	423	136	136	15	15	114	13,535 17
1899.. . ..	2,487	2,910	702	237	430	430	112	112	5	5	117	14,161 28
1900	2,679	3,213	893	247	447	447	126	126	22	22	126	14,782 53

The total number of registrations of copyrights, trade marks, industrial designs and timber marks, including registrations of assignments, was 1,624 during the year ended October 31, 1900. This consisted of 839 registrations of copyrights, 447 registrations of trade marks, 126 of industrial designs and 22 of timber marks. There were also issued 235 certificates of copyrights, 55 registrations of interim copyrights, and 12 certificates, 27 registrations of temporary copyrights, and 10 certificates. The total number of assignments of these different rights recorded was 136.

The correspondence of this branch of the department amounted to 2,679 letters received ; 3,213 letters sent.

The amount of fees received during the year, as certified by the accountant, amounted to $14,782.53.

V.—QUARANTINE AND PUBLIC HEALTH.

The year has been marked by the ever increasing threatening of the bubonic plague, both from the Orient to the Pacific side, and from Europe, South America, &c., on the Atlantic side. This threatening and the recent outbreak of this disease in Glasgow have led to my adoption of stringent precautions to prevent its ingress to this country.

Smallpox has come to maritime quarantines on both coasts during the year. It has prevailed to such an extent in the neighbouring states that I have felt constrained to establish a protective inland quarantine service on some of the international frontiers of the Yukon Territory, and of the provinces of British Columbia, Manitoba and Ontario ; and to suspend for the present my exemption of quarantine inspection of vessels from San Francisco and ports north of it.

Early last spring I sent Dr. Charles Higgins, bacteriologist, to the William Head Quarantine Station, at Victoria, B.C., to give the superintendent there his expert assistance in diagnosing, &c., any cases of plague or suspected plague that might present themselves.

Full details concerning the year's work at the different stataions, and at the Tracadie Lazaretto, will be found in the reports of my officers, annexed as appendices.

TRACADIE LAZARETTO.

The Inspector of Leprosy and Physician at the Tracadie Lazaretto (Dr. A. C. Smith) reports (see appendix No. 11) that there are twenty (20) inmates in the Lazaretto, being one less than the number reported the previous year, thirteen (13) of whom are males and seven (7) females.

There were four (4) deaths during the past year, and three (3) new cases were admitted during the same period.

The different stages of the disease at the present time is reported as follows :—

1st stage	7
2nd "	12
3rd "	1
	20

In the report of the Director General of Public Health (see appendix No. 1) will be found his remarks on leprosy.

VI.—STATISTICS.

The Statistical Division of the Department of Agriculture is based upon the Union Act, which specifically assigns census and statistics to the exclusive authority of the Parliament of Canada.

In accordance with this assignment of duties, the Parliament of Canada passed chap. 21, Acts of 42 Victoria.

In the Revised Statutes of Canada, 1886, this Act forms chapters 58 and 59. Chap. 60 is the authority for the collection of criminal statistics.

As misapprehension seems to exist leading to indiscriminate and unofficial publication of statistics, sections of the Act, chap. 59, R.S.C., are here given :—

The first section provides for the collecting, abstracting, tabulating and publishing of vital, agricultural, commercial, criminal and other statistics by the Department of Agriculture.

The fourth section gives the Minister of Agriculture power to arrange with any Lieutenant-Governor in Council, or with any provincial organization, for the collection and transmission of information collected under provincial systems.

The fifth section says :—

'The Minister of Agriculture may, in collecting statistics in the manner provided by this Act, call upon any and all public officers to furnish copies of papers and documents and such information as lie respectively in the power of such officers to furnish, with or without compensation for so doing, as is regulated, from time to time, by the Governor in Council.'

The sixth section provides for the publication of an abstract and record of the various departmental or other public reports and documents.

The seventh section gives power to the Governor in Council to authorize the Minister of Agriculture to cause special statistical investigations as regards subjects, localities or otherwise to be made.

The eighth section empowers the Minister of Agriculture to cause all statistical information obtained to be examined, and any omissions, defects or inaccuracies discernible therein to be supplemented and corrected as far as possible.

The ninth section is as follows :—

'Every one who wilfully gives false information or practices any deception in furnishing information provided for by this Act shall on summary conviction before two justices of the peace, be liable to a penalty not exceeding one hundred dollars.'

By another section in the Act, the Governor in Council is empowered to appoint temporary clerks or employees for an indefinite period.

The evident aim and intention of these several Acts is the establishment of a Bureau of Statistics which shall form part of the Department of Agriculture, and in which shall be consolidated the general statistics of the country, the officers in charge of which shall have every facility necessary to enable them to obtain the needed statistics from the several departments of the Federal Government, of the Provincial Governments, or by special statistical investigations.

A general collection and issue of Dominion Government statistics by the Statistical Division, as directed by the statute, would establish uniformity, coupled with increased accuracy and large economy in compilation.

The public appear to appreciate the efforts of this division of the Department of Agriculture, the preparation of general statistics in answer to inquirers having been greatly in excess of former years ; the aim is to give all inquirers the best information obtainable. The statistician's office has become a general inquiry office for all parts of the world.

In the course of these inquiries the statistician has been forced to confess the fact that Canada lags behind other countries in many branches of statistics.

In no branch have there been so many inquiries as to that relating to agricultural statistics. These inquiries have necessarily been answered in a most unsatisfactory way, owing to the absence of any system of collecting agricultural statistics co-extensive with the Dominion. If a good plan, ensuring accuracy and early publication, could be adopted in Canada, the value to farmers and business men of this information can hardly be over-estimated.

HEALTH STATISTICS.

No steps have been taken as yet to provide a better system of collecting vital statistics than that which was abolished in 1891.

In the provinces of Ontario, Quebec, New Brunswick, British Columbia, Manitoba and the North-west Territories, the provincial and territorial authorities have placed on the statute-books Acts dealing with the collecting of vital statistics. Section 4 of chap. 59 Revised Statutes, already quoted, gives the necessary legislative authority to enable my department to join the provincial authorities in making arrangements for the better collection of different kinds of statistics, without limiting the power of my department to enter upon provincial fields not worked by provincial organizations. By a combination of forces the result would be more satisfactory than by any other system that could be originated by the federal authorities. Instead of clashing statistics there would be statistics having a joint approval.

This plan could be carried out in respect to agricultural statistics ; so that while each province could have its own statistics for publication, the world at large would have those of the Dominion. The very great attention given to crop statistics in the United Kingdom, United States, France, Germany and Australia, and the large monetary operations based upon them, make it almost imperative upon Canada to provide her farmers and business men with these aids to successful efforts.

CRIMINAL STATISTICS.

During the twenty-four years, 1876-99, the functionaries of the courts or tribunals for the administration of justice in Canada have been called on to supply the Department of Agriculture and Statistics with returns giving certain particulars respecting crime, in accordance with the requirements of the statute chap. 13, Acts of 1876, as modified by chap. 60, Revised Statutes of Canada, 1886.

The classification adopted is the general one of indictable offences and summary convictions. The indictable offences are tried either by jury or (with consent) by police or other magistrate, and under the Speedy Trials Act.

The statistics of the earlier years are not complete, since the work was new to the officials. The country has, however, a body of statistics, fairly accurate, relating to crime for the period 1883-99.

This, though limited compared with the long-collected statistics of crime in many other countries, possesses value in enabling us to determine the position of Canada in respect to crime.

Taking, however, the period 1887-99 for our guidance through the labyrinths of criminality, we have for the thirteen years 484,260 convictions for indictable and other offences.

These totals show an average of 37,250 convictions for offences of all kinds. In the year 1899 the convictions were 38,710. Both absolutely and relatively to population punished crime in 1899 was higher than in 1898, as in 1898 it was higher than in 1897.

Of the 484,268 convictions, 60,981 were for indictable offences, the charges numbering 88,523, so that convictions formed 68·9 per cent of the charges. This approximates closely to the ratio in the two countries from which the great bulk of our population springs.

In the first three years of the period under review the charges made of crime and misdemeanours committed in connection with indictable offences averaged 5,659 a year. In the last three years they averaged 8,113, showing an increase in charges of indictable offences of 43 per cent.

The convictions consequent on those charges averaged 3,745 and 5,740 respectively, an increase of 53 per cent. Convictions, therefore, increased at a greater rate than charges, showing either more care in preferring the charges or stricter administration of the laws, or, more than probable, both greater caution in making charges and stricter administration.

Males convicted of indictable offences averaged in the first three years 3,416, and 5,392 in the last three years of the thirteen-year period, while females averaged 328 in the first, and 347 in the last, term of three years.

The proportion of the sexes in the first three-year period was 91 males and 9 females. In the last three-year period it was 94 to 6. The proportion of women criminals in the greater crimes is smaller, and may be said to have become fixed at the figure of 6 in the 100 criminals, with a slight tendency to a reduction of the rate.

The number of persons convicted for the first time in the first three years of the thirteen-year period averaged 3,210, and in the last three years 4,520. Relatively these criminals were 86 per cent of the total convictions in the first three years, and 84 per cent in the last three years.

Recidivists have increased, those convicted frequently forming nearly 10 per cent of the convicted in the last three years against 4·41 per cent in the period 1887-89, and those convicted twice forming 11·3 per cent against 5·3.

The increase is largely in the mining provinces of the Dominion.

According to occupations, the statistics warrant the following conclusions :—

1st. That compared with their numbers the agricultural class contribute a very small percentage to the criminal class.

2nd. That the commercial class commit, more than their proportionate numbers in the body politic warrant, crimes under the head of offences against the person forgery and offences against the currency.

3rd. That the domestic class commit crimes just about in proportion to their numbers.

4th. That the industrial class have less than their proportion in all the six divisions of crime except in offences against property with violence, where they slightly exceed their proper proportion.

5th. That the professional class provide a much lower percentage of criminals than their proportionate share in the occupations would give.

6th. That labourers contribute more than their share to every class of crime, their percentage being : Crime 29 per cent, population 12 per cent.

About 60 per cent of the convicted were born in Canada. As the Canadian born population is 86½ per cent of the whole population, the criminals in the Dominion born outside of Canada are more numerous relatively than the Canadian born, forming but 13½ per cent of the population and supplying 40 per cent of the criminals.

Those unable to read and write formed about 13·8 per cent of the convicted in the 1897-9 period, against 14·9 per cent in the 1887-9 period. Those possessed of an elementary education were 74·5 per cent of the whole in 1897-9, against 76·6 per cent in 1887-9 period. Those having a superior education formed in both periods somewhat over 1 per cent of the convicted.

Cities and towns furnish 76 per cent of the criminal class of Canada, and the urban population is about 30 per cent of the whole population.

The total number of persons charged with murder during the thirteen years under review was 304, and the convictions numbered 99. The acquittals were 67·4 per cent of the charges. In the United Kingdom, France, Germany, Hungary, Italy, Spain and Belgium, taken together, the acquittals are 64 per cent of the charges in the case of the crime of murder. Canada approximates closely to the standard of these European countries.

There has been a decrease in the number of arrests and convictions for drunkenness; the annual average of the three years, 1887-9 being 12,821, and that of the three years 1897-9 being 10,980, while convictions for infractions of liquor license Acts fell from an annual average of 3,700 in the first period to an average of 2,120 in the last period.

During the period 1894-99 the convictions for drunkenness and for infractions of liquor laws have been separated according to sex of offender.

For infractions of laws relating to liquor there have been in the period named 1,678 convictions of women, and for drunkenness 6,530. This is a yearly average of 280 for the first class of offences and 1,088 for drunkenness. The number of cases in 1889 was 303 for breaking the laws relating to liquor selling and 1,043 for drunkenness.

The proportion of women to men in 1894 was 102 in every thousand convicted of drunkenness, and in 1899 it was 94 in every thousand convicted.

The proportion of women to men convicted for breaking the laws relating to the sale of liquor in 1894 was 126 in the 1,000, and in 1899 it was 146 in the thousand.

There seems an opening here for women to exert their influence upon women to prevent the extension of woman's aid and co-operation in infractions of laws designed to curtail the distribuiton of intoxicating liquors.

The returns of 1899 are instructive, inasmuch as they show a danger to the State from the increase of juvenile crime.

One-third of all the convictions for indictable offences in Canada in 1899 was of persons under 21 years of age, and nearly one-half of this third were convictions of persons under 16 years of age.

The increase in 1899 over the average of a fifteen-year period is :

Criminals under 21 years	476
" " 16 "	289

This leaves the increase of criminals between 16 and 21 years to be 187 against an increase of 289 in the number of criminals under 16 years of age.

Thus the increase in juvenile criminals is much greater among those under 16 years than among those between 16 and 21 years.

There were 5,713 convictions for indictable offences in 1899. Of these 1,917 were of persons under 21 years, and of these 1,917 no less than 936 were under 16 years.

During 15 years the total number of convictions for indictable offences was 68,287. Of these 20,606 were of persons under 21 years, and divided into 11,911 between 16 and 21 years, and 9,705 under 16 years.

In the whole period juvenile criminals were 30·2 per cent of the total number ; in 1899 they were 33·3 per cent. In the first year of the series (1885) they were 29·3 per cent, thus showing a gradual but steady increase.

Taking the 936 juvenile criminals under 16 years, they are divided for 1899 into :

	Males.	Females.
Juveniles committing offences against the person......	42	—
" " " " property with violence........	87	—
Juveniles committing offences against property without violence.....	740	37
Juveniles committing malicious offences against property.....	19	—
Juveniles committing forgery and other offences against currency....	8	—
Juveniles committing all other indictable offences......	3	—
Total....	899	37

The overwhelming proportion of juvenile crime is in the three classes which include offences against property, and the very great proportion is in that particular class denominated 'offences against property without violence,' these numbering 777.

Analysis shows that of these 777 cases, 768 come under the head of larceny—picking up things that belong to some one else and appropriating them.

The table above given shows the distribution of the remaining 159 cases.

THE STATISTICAL YEAR-BOOK.

The work is published by my department under authority of chap. 59, sec. 6, Revised Statutes of Canada.

The demand for the work increases every year. Requests for the 1899 edition from the governments, public libraries and chambers of commerce of France, Germany, the United States, Italy, Japan and other foreign countries have been received, while the number required for the United Kingdom and other portions of the British Empire has been larger than ever.

An increasing number of lengthy notices, abstracts and resumes of the Year-Book is noticeable in the newspapers of Great Britain, France, Germany, Japan and other countries.

The demand within Canada continues to increase every year.

There is a great demand for back numbers to make up full sets. As a result, the edition of 1893, '94, '95, '96 and 1898 in English are completely exhausted.

The Year-Book in French has been increasingly in demand. Of the earlier years there is a good number in stock. Of later years, 1891-98, there remain very few copies, and of 1891, '93, '94 and 1895 none at all.

The demand of late years for the French version is the most satisfactory fact in the history of the Year-Book.

During the year the letters, circulars and statements sent from the office numbered 7,550, and those received 8,391.

The whole respectfully submitted.

SYDNEY A. FISHER,

Minister of Agriculture.

APPENDICES

QUARANTINE AND PUBLIC HEALTH.

No. 1.

REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH.

(F. Montizambert, M.D. Edin., F.R.C.S., D.C.L.)

October 31, 1900.

Sir,—I have the honour to submit herewith my annual report as Director-General of Public Health, to October 31, 1900.

The year has been marked by the continued threatenings of bubonic plague, and its actual outbreak in several new quarters. Smallpox also threatened us on both coasts and along the inland frontiers to even a greater degree than is customary.

Bubonic Plague.—The outbreak in Santos in October, 1899, referred to in my last annual report, was followed by the occurrence of the disease at several other ports in Brazil, including Rio de Janeiro, and in the Argentine Republic. Most of the important seaports of Australia have been infected since the beginning of this year, when cases occurred first at Adelaide. It is probable, owing to the numbers of Chinese, that the infection there has usually arrived from China. Sydney has had 303 cases, with 183 deaths. On September 30 last a case occurred at Charters Towers, a great mining centre, the first inland Australian town to be visited by the disease.

The epidemic in Oporto and other parts of Spain continued during the winter; the port of Oporto was not declared to be free from the disease until the month of February. At Lisbon, a medical man, Dr. Camara Pestana, was amongst the victims. A London correspondent of the London *Times* sends some pathetic details of his death: 'It seems that Dr. Pestana actually caught the plague through his anxiety to learn all that he could about it. He was dissecting the body of a patient who had died from plague, and in order to extract the virus more thoroughly he put aside his instruments and worked with his fingers. The poison entered his system under the fingernails, and he was struck down with the terrible disease which he was investigating. He was at once moved to an isolated ward set apart for plague sufferers, and there he set himself to study his own case and to record for the benefit of humanity his own symptoms, and the course of the disease. He refused to see his brother for fear of infection, and in every way, even in making arrangements for his own funeral, he took every precaution to prevent the spread of the plague. His mind and will conquered his bodily sufferings until the very end, and even as he died he was still trying to indicate to those around him the lessons of his own case. He left a letter for the Queen of Portugal, begging for her influence in favour of his colleagues at the Lisbon Bacteriological Institute. So died the heroic doctor, who "had toiled for months amid the horrors of the plague hospital and dissecting-room, and at last gave his life a willing sacrifice for the benefit of the whole world."'

In China, plague has been present, as always. In Hong-Kong alone, the reported cases, from January 1 to September 1, numbered 1,063 with 996 deaths.

In Japan it has been present, principally in Osaka and Kobé: it still prevails in Kobé.

It has occurred in the Philippines, with 215 reported cases in Manila and 146 deaths.

It has prevailed in India throughout the year. During the last week of September and the first week of October the number of deaths from plague in India were 2,136 and 2,123 respectively; there was thus a slight decline. This is a hopeful sign, as during every autumn since 1896 the number of deaths from plague has increased progressively week by week until the present year. It is unwise to build upon so slight a decrease, and to prophesy a cessation, but in the northern parts, at all events the lessening of the severity of the famine may have something to do with the relative falling off of plague cases.

In Bombay the number of plague deaths was 87 and 86 respectively for the last week of September and the first week of October. These returns show that the mortality from plague this year is but half of that recorded during the corresponding dates of the past four years. Mandvie, the district of Bombay where plague first appeared, and where during every recrudescence it has been most virulent, accounts for 21 out of the total of 87 deaths recorded in Bombay. In every other district an improvement is evident, and it is surely time that the sanitary authorities in Bombay seriously tackled this insanitary district, completely evacuating the whole of it, if need be. This may appear an expensive and a high-handed measure, but if it would rid Bombay of plague, it would be repaid a hundredfold in the near future.

In the Bombay presidency, during the week ending October 7, there were 1,142 deaths from plague; the majority of the deaths occurred in the cities of Poona and Belgaum. In Poona the numbers vary from day to day, but between 70 and 104 deaths were recorded daily during the week. Many of the shops in Poona are closed, and the well-to-do residents are once more leaving the city. The authorities are closely watching the effects of inoculation in the community. Fifty-two persons inoculated more than a year ago have had the disease, but only in a mild form. In the Poona cantonment no case of plague had occurred amongst those inoculated last year. Among 7,688 persons inoculated this year no cases have occurred up to the present.

In Belgaum the disease continues unabated, some 20 to 30 deaths from plague occurring daily. Three Europeans (two soldiers and one civilian) attacked by plague are all recovering.

In Mysore City the alarming increase previously reported continues. Abandoned corpses, dead of plague, are being found in several districts of the city, proving how severe is the epidemic. During the three weeks previous to October 7, the plague deaths in the city of Mysore numbered 480, 609, and 543 respectively.

In Bangalore the mortality from plague, during the three weeks previous to October 7, was 65, 95, and 91 respectively. Where places have been found newly infected, dead rats have been met with in numbers.

A great outbreak of plague is reported from the Kolar gold fields.

In Calcutta the plague deaths during the two weeks previous to October 7 were 47 and 88 respectively.

It has appeared in the Hawaiian Islands ; Australia ; in Aden, Port Said and Alexandria; in Cape Town; Mauritius; in Brazil, in Paraguay, and the Argentine.

Vessels with plague cases on board were brought into several English ports, and to San Francisco, New York, and Port Townsend.

Bubonic plague was brought into New York harbour, November 18, on the steamship *J. W. Taylor*. The ship left Santos, Brazil, October 24, sailing directly to New York. Robert Hope, the steward, had been in a hospital in Santos for a fortnight, suffering with what was supposed to be eczema. He returned to his ship when it was ready to sail, and was able to attend to his duties. After being on board for a week he was compelled to go to bed, and died in a few days. No physician was on board, but from the symptoms, which were carefully recorded, there is no doubt that his death was the result of the plague. The disease had been present in Santos for several weeks, and there is nothing strange about Hope having taken it. The day he died, the captain and the cook, both of whom had been taking care of the deceased steward, were taken down with the premonitory symptoms of the disease. On arriving in New York, the two sick ones were sent to Swinburne Island. Every possible care was taken to prevent the possibility of the extension of the disease.

It was brought to the quarantine at Port Townsend, on the Strait of San Juan de Fuca, opposite William Head, on January 30, by the Japanese steamship *Nanyo Maru.* There was one death at quarantine from the plague.

It has just been brought to the port of Bremen on the steamship *Marienburg,* from Buenos Ayres.

In Glasgow, the recent cases of plague amounted in all to 28 definitely reported since the end of August. There have been eight severe cases, and of these all eight died. The source of infection was not clear, but the tendency is to connect it with the shipping. The cases occurred, however, at a distance of over two miles from the docks. There were also four cases of plague or suspected plague in Govan. Surgeon-General Wyman received a report from Assistant Surgeon Thomas, of the Marine Hospital Service, in charge of the plague inspection work at Glasgow, detailing the history of the outbreak. The report states that all the cases are to be traced to a wake held over a woman who died about August 21. She lived in a crowded tenement quarter, some distance from the shipping, and no connection can be traced between her sickness and any infected ship, except that her husband was at work on the docks. The disease in the early cases was of the pneumonic form, and the death of this woman was certified as pneumonia, and there were a number of other cases of supposed pneumonia among those who had attended the wake or had been thrown into contact with the woman. On August 25 a child died, and on the 27th his mother and two brothers were taken to the hospital. One of the brothers died, and his death was certified as bubonic plague. Cultures of the plague bacillus were made from his organs, but the inoculation experiments are not yet complete. As soon as a suspicion of plague arose, all persons known to have been in contact with the cases mentioned were removed to new quarters, were bathed, and their clothing was disinfected. A few cases have been sent to the hospital from this contingent. All the cases in the hospital at the time of Dr. Thomas's report were of the bubonic form. Careful inquiry does not show that there has been any unusual mortality among the rats in Glasgow, but war has nevertheless been declared against them, and rat-catchers are busy capturing and killing them.

The most satisfactory theory of the origin of the outbreak is that the source was an unrecognized ambulant case which occurred in some sailor or traveller. As in other diseases, while plague is extremely easy of recognition in well-marked typical cases, it is not so in its slighter and atypical forms.

On the 4th of this month a death from bubonic plague occurred in Cardiff, Wales. W. Garnett, aged thirty-eight, donkey man on board the ss. *South Garth,* left Rosario (La Platte) about August 20. The vessel called at Buenos Ayres and shipped, in place of an old hand who deserted, a new one—an Austrian—who acted as third engineer. When the vessel arrived at the Tyne, on September 21, this man, who was seriously ill from 'enteric fever,' was sent ashore to a hospital. Two days subsequently Garnett left the boat at South Shields in consequence of not feeling well. He travelled from there to his home in Cardiff, reaching his destination on September 27. He was medically attended from September 28 to October 2, when, suspicious symptoms developing, he was transferred to the Cardiff Isolation Hospital as a possible case of plague. He died on October 4. The clinical diagnosis of bubonic plague was confirmed by the bacteriological examination. The body was at once removed to an island in the Bristol Channel and cremated.

There can now be no doubt that Chinatown, San Francisco, has been infected with the bubonic plague since the early part of this year at least, although the number of cases reported is small. Between March 8 and June 2, ten fatal cases of this disease occurred in San Francisco amongst the Chinese. On May 19 the local board of health officially announced the existence of plague in San Francisco. Another case was found on June 14, others during July, and this month three cases have been reported, one on October 5, one on October 10, and one on October 14, all confirmed by bacteriological examination; a total of nineteen cases reported, with seventeen deaths. How many more have died of the disease, how many corpses or bones of such persons have been shipped from, or are now waiting shipment to China in, the underground hiding-places of Chinatown, San Francisco, probably no white man knows or ever will know. Dr. Kellogg, the city bacteriologist of San Francisco, under date of May 19 last, wrote as follows:—' Just how the disease was introduced into this country is a mystery, as the first case discovered was in a Chinaman who had been in Chinatown sixteen years. The probability is that he was not the first, and this theory is strengthened by the fact that there had been an increased mortality in that district during the months of January and February. During those months there were 97 deaths reported from the Mongolian quarter, and of these 20 were ascribed to lobar pneumonia, 5 to bronchopneumonia, 4 to typhoid fever, and 7 to acute miliary tuberculosis. Now all of these diseases, in the beginning of an epidemic of plague, should be regarded with suspicion, and examined bacteriologically, for they are simulated very closely by the pest.

' The assistant city physician, whose duty it is to inspect all dead Chinese who have died without attendance by a regular physician, is at a great disadvantage in arriving at the cause of death. He simply sees the body after death, and by questioning the relatives or undertaker, who are ignorant and use very broken English, he makes a guess at the cause of death, taking into account the appearance of the body. According to the Caucasian statistics of San Francisco, the number of deaths from pneumonia, typhoid, and miliary tuberculosis, to every 97 deaths, would be 12·3, whereas the assistant city physician, with the means at his command, has been forced to consider that there were 36 of these cases out of a total of 97 deaths for the two months. Since the plague can readily be mistaken for these diseases, we are justified in the suspicion that some of these cases were plague. Nor is the fact that we have not now a widespread epidemic proof to the contrary, for it has been the history in other parts of the world that the plague gets a foothold very slowly and insidiously. There is a first case, and then it may be a couple of weeks before the second, and they may appear occasionally and at intervals of several days or weeks, until the houses and the quarter become infected, and then the real epidemic breaks out, and hundreds of cases occur.'

The following report of the last three cases of bubonic plague in San Francisco this month is given in the Journal of the American Medical Association :

Case 16.—Lea Do Hen, aged 50, Mongolian, cigarmaker, had lived in California 28 years. His residence was 710½ Dupont street. Patient died Oct. 5, at 10 p. m.

Examination of the body revealed a large bubo in the right inguino-femoral region. Incision disclosed a lymph node about the size of an egg, surrounding which the tissues were filled with a chocolate-coloured fluid. The cut surface of the gland was very dark, purple and mottled, but substance fairly firm. A microscopical examination showed numerous bipolar-staining bacilli, decolorizing by Gram's method. Two guinea-pigs were inoculated with a glandular emulsion on Oct. 7.

One of the pigs lived four and one-half days after inoculation. On examination there was found a large area of coagulation necrosis surrounding the point of inoculation on the anterior abdominal wall. There was widespread edema and hemorrhages into the subcutaneum. The lymph nodes were enormously enlarged in both groins, the mass on each side being about the size of a lima bean. Both lungs were studded with yellowish-white nodules. Each pleural cavity contained about 2 c.c. of pinkish mucilaginous fluid. The liver was greatly enlarged, congested and mottled. Spleen was about fifteen times its normal size, dark and friable, and covered with yellowish specks. The vessels of the mesentery were injected. There was a small amount of pinkish fluid in the peritoneum. The suprarenal capsules and pelves of both kidneys were hemorrhagic. The organs of the animal contained the plague bacillus in great numbers, and it has been obtained in pure cultures from them.

Case 17.—Chun Yen, male, aged 37, Mongolian labourer, had been in California 10 years. Residence was 767 Clay street. Patient died Oct. 10, at 2 a.m. According to the statement of a white physician who lives and practises among the Chinese, he was sick two weeks and died of typhoid pneumonia. The body was that of a very large, fat and well-nourished man, who would probably weigh 200 pounds. An enlargement of the glands of the left femoral region could be detected through the thick layer of fat. These were removed and found to be about the size of hazel-nuts, very dark and necrosed. Smears showed the typical bipolar bacilli in large numbers. Two guinea-pigs were inoculated on October 11, with an emulsion of the glandular tissue, and both lived about three and one-half days.

Autopsy: Guinea-pig No. 1. Large areas of coagulation necrosis surrounding the point of inoculation; marked subcutaneous edema; enlargement of the lymph nodes and hemorrhages in the left groin and axilla; lungs normal; spleen about three times normal size; very dark and soft, but no yellow spots; punctiform hemorrhages in peritoneum covering small intestines.

Guinea-pig No. 2. Large area of coagulation necrosis at the point of inoculation, surrounded by a zone of edema and subcutaneous hemorrhage; a marked hemorrhage in the left groin, but no enlargement of the glands; lungs normal; spleen about three times normal size and shows a few yellow spots; same condition of peritoneum as in first pig.

The plague bacillus was recovered in pure culture from both pigs. It is worthy of note that Chun Yen contracted the disease in the same house as the thirteenth case, that of Lee Wing Tong. This house was quarantined and thoroughly fumigated in the interval between the two cases.

Case 18.—Tai Dong Leong, male, aged 39 years, Mongolian, had lived 25 years in California. Residence was 905 Clay street. Patient died October 14, at 11 p.m.

The diagnosis of this case was established by a clinical examination of the blood during the life of the patient, who was attended by a reputable white physician, who reported the case to the health department as suspicious, as soon as he had seen it.

On October 14, the patient was seen by a number of physicians, among them were Drs. Ryfkogel and Kinyoun, and blood, as well as some fluid from the bubo, were secured for examination. These samples both showed the specific bacillus in large numbers, and it was also secured in pure culture from both sources.

Two guinea-pigs were inoculated, one with the pure culture grown from the blood, and the other with spleen obtained at the autopsy.

The guinea-pig inoculated with the pure culture died in four days of a typical plague infection, there being the usual coagulation necrosis at the site of inoculation; a moderate amount of subcutaneous edema; and an enlarged spleen; the latter however, in this instance, containing much larger numbers of the plague bacillus than usual.

The following letter concerning this outbreak in San Francisco has just been addressed to Surgeon General Wyman:

'SAN FRANCISCO QUARANTINE STATION,
'ANGEL ISLAND, CAL., October 29, 1900.

'SIR,—In reply to Bureau letter of the 20th instant (C. H. W.,) and in confirmation of telegram sent on the 27th, I have the honour to state that during the month of October three cases of plague have occurred in San Francisco among the Chinese. All cases terminated fatally. The first death occurred on October 5, at 720½ Dupont street. The case was a cigarmaker, who had been working just previous to his last illness in a cigar factory on Battery street. The history which was obtained from the acquaintances of the man was that he had been ill about four or five days before death. No clinical history of his illness could be obtained. The post-mortem examination was limited to the removal of the enlarged femoral glands, which, on examination, both microscopically and bacteriologically, showed the plague bacillus. The bacteriologist of the city board of health submitted some of the gland tissues to me for an examination. This was examined in the laboratory at this station, with the result of confirming the diagnosis.

'The second death occurred on October 10 at 767 Clay street, in the same house whence a case of plague was removed to the city hospital, dying there on July 5. This man had been ill for a week or more, and was treated by a white physician. The death certificate gave the cause of death "typhoid pneumonia." Dr. Kellogg informs me that on inspecting the body a mass of enlarged femoral glands was seen, which, on removal, showed evidences of acute infection. Microscopical and bacteriological examination demonstrated the cause of death to be plague.

'On October 14, at request of Dr. O'Brien, the health officer, I visited a case at 905 Clay street, which was reported to present certain suspicious symptoms. This case gave a history of being ill for three and one-half days. The attack commenced with a rigor, followed by fever, giddiness, nausea, and vomiting. He was seen on the evening of the 13th by a white physician, who stated that his temperature at the time of his visit was considerable over 38° C., pulse very rapid and weak. There was also nausea, vomiting, and slight diarrhœa. On the following morning—the 14th—a considerable swelling of the glands in the femoral regions was observed. There was considerable elevation of temperature, and more prostration than existed the day previous. He then reported the matter to the health officer as being probably a case of bubonic plague. The patient was seen about five o'clock on the same day by several physicians, viz.: Drs. Bulkley and O'Brien, of the health board; Dr. Bunnell, police surgeon; Dr. Ryfkogel, bacteriologist to the State board of health, Dr. Lumsden, Dr. Pillsbury, and myself. The patient presented the appearance of one profoundly ill with an acute infectious disease. His temperature was 39·7 C., pulse 140, soft and compressible. There was considerable delirium. Physical examination revealed an enlarged spleen and a mass of enlarged glands in the left femoral region. There were also several reddish spots over the chest and abdomen, having all the appearances of subcutaneous hemorrhages. Cover slip preparations were made from the blood, and also of the fluid aspirated from the gland. Cultivations were also made from the gland and blood. Microscopic examination of the cover slips demonstrated the presence of numerous diplo-bacilli, which morphologically resembled those of bubonic plague. These bacilli took on a bipolar stain with thionine, and were easily decolourized by Gram's method. The cover slips made from the fluid removed from the gland contained countless numbers of these bacilli. In fact, it appeared more like that of a pure culture of plague than a specimen taken from the body. The case died at eleven o'clock that night, and on the following day Dr. Kellogg, the bacteriologist, made a post-mortem examination, removing the spleen and mass of enlarged glands. These tissues on examination gave the typical appearances of plague infection.

'On the following day, the 16th, colonies had developed in the tubes inoculated from the blood and glands. These were examined and found to be those of bubonic plague. Animal inoculations made from these cultures were in every way confirmatory.

'The State board of health have instructed their bacteriologist, Dr. Ryfkogel, to be present at all post-mortem examinations and make an independent investigation. All sanitary inspectors, which were for a time employed by the various members of the board of health at the instance of the governor, have been discharged. Dr. Crowley, a member of the State board of health, stated to me on the 27th instant that the State board of health was of the opinion that for the time being the city board of health was able and ample to meet the requirements of the situation; that while there had been bacteriological evidence of the existence of bubonic plague, there was not sufficient clinical data to warrant any steps to be taken. * * *

'In conclusion, I would state that it is my belief that the area of infection is gradually growing wider, so that now there are only three blocks of the Chinese quarter proper in which there has not occurred, since March last, a case of plague. The conditions which will obtain in the next six months will be, in my opinion, conducive to a further outbreak. The Chinese population will, in a few weeks, be augmented by several thousand more than exists during the summer months. About 3,000 Chinese return every fall from the salmon canneries of Alaska. Then, at the end of the fruit-picking season, which now is rapidly drawing to a close, large numbers of Chinese who are thus engaged seek a temporary home in San Francisco during the winter months. These people to all intents and purposes are contract labourers, and are of the lowest coolie class. They live under the worst hygienic conditions imaginable. It would, therefore, not surprise me to see a number of cases of plague occurring among this class of people. I will transmit, as soon as obtainable, a map showing the infected area, as well as the number of cases which have already occurred.

'Respectfully,

'J. J. KINYOUN,

'*Surgeon, U. S. M. H. S.*'

Haffkine's Fluid.—Drs. Christie and Neild Cook have recently published the results of their experiment with Haffkine's fluid in Calcutta in 1898. They inoculated some 2,490 patients between April and July, none of whom died of plague during that year's epidemic. The ordinary dose of Haffkine's prophylactic for an adult male was 5 c.c. ; for a woman, 4 c.c. ; for girls between the ages of ten and fourteen years, 3 c.c.; for children from two to ten years, from 1½ to 3 c.c. The writers selected the back and outer side of the arm midway between shoulder and elbow as the site of inoculation. The reaction in many cases began at once with pricking at this site, and the gradual formation of a hard, tender red swelling for a few inches round. The temperature rose within six hours. The height of the fever varied greatly, rarely lasting more than two days, though the arm remained more or less painful and tender for a week or ten days, and a small, hard nodule often remained for a few weeks. There were no untoward results.

Viability of the Plague Bacillus.—In a preliminary note issued in the Public Health Reports of the United States Marine Hospital Service, Dr. Rosenau places on record the results of some experiments upon the length of time for which the plague bacillus retains its vitality. The method employed consisted in keeping various materials infected with this bacillus under varying conditions of light, temperature, and moisture. The organism was obtained from five different sources—one from Jeddah, one from Oporto, one from Rio de Janeiro, one from Bombay, and the fifth from the New York quarantine case. The bacillus retained its vitality and virulence (for mice) for seventy-five days on small balls of absorbent cotton soaked in a few drops of a gelatine culture mixed with egg albumen, when these balls were kept in a dark room or cool incubator at about 20° C., and not exposed to the influence of other contaminating organisms, though desiccation was not materially retarded. On other material exposed to higher temperature (27° C. or over), vitality was lost in a period not exceeding a fortnight. The other materials infected were small squares of fabric, chips of pine wood, and pieces of paper. No experiments in which mixed infection played a part are recorded, so that natural conditions were apparently not reproduced. Appended to the account of these investigations is a summary of the results of other experimenters who have worked on the same lines, and it is evident from this that the plague bacillus cannot withstand desiccation at temperatures approaching 30° C. Dr. Rosenau has been more successful than any other investigator in keeping that organism alive for seventy-five days, but the conditions of the experiment were such that complete desiccation was not obtained. The practical bearing of experiments in which pure cultures are used, and in which mixed infection plays no part, is small, and bacteriologists and hygienists in general are still waiting for an exhaustive series of investigations into the viability of this bacillus under circumstances which shall more faithfully reproduce the environment and conditions of plague-infected material as met with in its endemic home.

A City Plague Laboratory.—The New York city board of health, at a recent meeting, awarded a contract for the building of the laboratory for the study of the bubonic plague on the Willard Parker Hospital grounds at the foot of East Sixteenth Street. The cost of the building will be $19,893. The laboratory is to be built in three months.

Dr. Yersin is of opinion that no conclusions can be drawn from the exceedingly mild type of the disease in the recent epidemic of plague in Oporto and in the outbreak in Glasgow as to the severity of possible future otbreaks in the British Isles or elsewhere in Europe. In the Far East it has often happened that one town has a mild form of plague, while a town not far distant presents a very grave type of the disease. With the plague we must be prepared for any type of the disease. It is quite possible, when in the course of the next few years the bacilli have become acclimatised in their new surroundings, that their virulence will increase, and that we shall see the same severe form of plague as visited Europe in the Middle Ages.

Precautionary Measures.—In my last annual report I mentioned the refusal just received from the Institut Pasteur, Paris, to my application with regard to a supply of anti-plague curative serum, Canada being a non-contaminated country. Since that time, however, this restriction has been removed, and there is now a sufficient supply of this serum available for issue at a day's notice to any station where it may be required. Haffkine's prophylactic fluid for inoculation as a preventive against plague has been issued to your quarantine stations, and a considerable stock of it is on hand for further distribution, should circumstances so require.

A supply of the Danysz rat virus (the *bacillus typhi murium*) has also been issued to your stations, and communications opened with the shipping ports, with a view to endeavour to destroy, or diminish in number, the rats which infest the piers and shipping warehouses. The cultures of this bacillus convey a fatal disease to rats, but do not affect other animals.

At intervals during the year letters of warning and direction were sent to your various quarantine officers as the increasing threatening of plague seemed to require. Full instructions were supplied them as to the most recently accepted practical and scientific measures to be adopted.

The shipping companies were communicated with, as well as the quarantine officers, with regard to the prevention of the landing in Canada of rats from vessels plague infected or from a plague infected port. The use of large funnels of galvanized iron to guard the hawsers between such vessels and the piers or lighters was enjoined, both to prevent the embarkation of rats at the port of departure and their debarkation at the port of arrival. In conjunction with this, the closing, as far as possible, of all means of ingress and egress at night, and the guarding of any left open was desired.

When plague was declared at Glasgow, vessels coming from there were required to produce a record, taken within twenty-four hours of arrival, of the temperatures of those on board for the information of the quarantine officer. This procedure, even where no surgeon is on board, is of use to the quarantine officer and presents the further advantage that it ensures the bringing of all on board before and under the observation of the surgeon or master shortly before arrival.

In March last, on the occurrence of the first reported case of plague in San Francisco, your ministerial order under section 9 of the quarantine regulations, excepting from those regulations vessels from San Francisco and north of it, was by you withdrawn. Since that date all vessels from San Francisco, from Puget Sound ports, and from Alaska have been inspected on arrival at British Columbian ports.

And further, in view of the existence of plague in San Francisco, orders were issued that any Chinese from there arriving at William Head should be landed there and held under observation to complete twelve days from date of departure, with bathing and disinfection, this to include Chinese by healthy vessels. This period of twelve days is the maximum period agreed to as permissible for observation for plague by the International Sanitary Conference of Venice, as laid down in their convention signed there in 1897, and subsequently ratified at Rome.

Vessels from Glasgow arriving at Canadian ports since the outbreak of plague in that city have been held to complete the necessary period of observation at quarantine, where it has not been taken by the voyage. This period, as laid down in the above-mentioned convention, is not in ordinary circumstances to exceed ten days.

In June last, a request was received from the local health authorities in British Columbia to have all ships arriving from plague-infected ports fumigated with sulphur sufficiently to kill all rats and other vermin in said ships. This recommendation was, by your authority, replied to as follows:—

'To ensure destroying vermin requires simultaneous fumigation throughout vessel, and probably repeated. It involves landing all persons and at least partial shifting of cargo. The delay to all interests and possible injury of some cargoes renders routine sulphurizing of healthy vessels unjustifiable, and would practically close our ports. It is unknown elsewhere, and not proved essential by us since 1894. Funnels, guards, &c., already ordered at quarantine. Their use at Victoria and Vancouver comes under city health officers.'

With regard to the question of cargoes and importations of merchandise generally, it is a matter of international sanitary agreement that new merchandise need not be feared on account of its coming from an infected country, but may be accepted without question. Plague has been present in China for many years, and has been in Hong Kong since 1894. During those years hundreds of vessels have brought merchandise to our ports from the Orient. Thousands of vessels have arrived from various plague-infected countries at such ports as London, Liverpool, New York, &c., and yet not one single instance has occurred where infection can be shown to have been introduced by a cargo. With regard to importations from Chinatown, San Francisco, to the Chinatowns of Victoria, Vancouver, Westminster, Nanaimo, &c., I may say that but very little of this is carried on. Chinese merchants in British Columbia import directly from China. When they run short of anything such as nut oil, chow-chow, vermicelli, or soy, they may get a temporary supply from San Francisco, but it will be transhipped from there in bond and in the original parcel in which it left the Orient. The trade that formerly existed in cotton shirts, overalls and carpet slippers has now ceased, as these things are now all made in Victoria. Leather for shoes is occasionally purchased from San Francisco, but not often, and then from white merchants. Salt bean cakes, dried shrimps, and dried small fish are imported from California, but they are put up on the coast, far from San Francisco. Fruit and green vegetables grown in California are imported into British Columbia, and possibly some of it passes throgh the hands of the Chinese dealers in San Francisco. But if there be a risk in this, it is one that British Columbia shares with the remainder of this continent, wherever California fruit is brought into the market.

The practical evidence that no known spread of the disease has ever occurred attributable to classes of merchandise above referred to is being more and more corroborated by our increasing scientific knowledge of the life history of the micro-organism that gives rise to the disease.

The possibility of the spread of plague in Great Britain or the continent of Europe and in this country is a very pressing danger. That the mortality from the disease will be high or that any one locality will suffer severely is perhaps unlikely, but that cases will occur in our quarantines and at our seaports for the next few years must be regarded as probable. At no period since the Crusades have soldiers of so many nations flocked eastwards: never before have so many ships sailed for Asiatic ports, nor has communication between Asia and other countries been so intimate. As this has occurred at a time when plague may be said to be pandemic the danger of our infection is immediate. It is only by vigilance, constant and prolonged, that this, the most stealthy of infections, can be fought—a vigilance which must extend not merely for weeks or months, but for several years to come. The danger of plague infection will continue whilst plague exists in Asia, or whilst it is prevalent in any centre in direct communication with the rest of the world, and with us by land or sea.

Its control at quarantine or at a seaport depends greatly upon its prompt recognition. In doubtful cases, and they are many, a bacteriological examination is essential for the diagnosis.

Rigid quarantine of infected or inspected persons and clothing, and a wholesale destruction of rats are measures of the first importance.

Of paramount importance, however, is the need that quarantine officers should be able to diagnose accurately cases of plague, by bacteriological examination. Recognizing this fact, Dr. Higgins. your bacteriologist at Outremont, was transferred early this spring to the William Head quarantine station, and a bacteriological laboratory was established there. At it, in addition to his other duties, a full supply of Haffkine's prevention plague fluid was prepared by this efficient officer. Provision was also made in the last estimates for the establishment of a bacteriological laboratory at Halifax.

Recommendation.—I would respectfuly submit for your consideration the desirability of requiring each of your quarantine officers to go through a qualifying course of bacteriology. The necessary leave of absence, and possibly the granting of a locum tenens, being matters I would urge upon your favourable consideration.

If Dr. Higgins is to continue his investigations at Outremont—as he is anxious to do—I would beg leave respectfully to recommend that a permanent medical assistant with full knowledge and experience of bacteriology be appointed to the William Head station. The inspection and other work there are greatly increased, and call for a medical assistant, and the threatening of plague which we must expect to lie under for some years to come as it closes in ever nearer and nearer to us, warns us in unmistakable terms that that medical assistant should have the technical knowledge and experience necessary to diagnose by prompt bacteriological examination even doubtful cases of this disease.

For similar reasons I beg leave to similarly recommend that the vacancy at the Grosse Isle Quarantine station now being caused by the resignation of the medical assistant there, be filled by the appointment of a bacteriologist to the office. That station has already its laboratory provided and equipped.

Small-pox.—This disease has threatened us throughout the year, on the Atlantic and Pacific coasts, and from the neighbouring republic across the frontier. It came to your organized quarantines at Grosse Isle and William Head, and has caused you to establish an inspection service in Prince Edward Island, and at the unorganized inland quarantines at frontier points of entry from the United States. The disease in the States has been of a very mild type, the so-called 'ambulatory' form. This causes little loss of life, but is much more difficult to limit or control than a more severe type would be. When small-pox is severe the patients are in bed, and can therefore be identified, reported and isolated. When it is mild and the patients walk about and travel, distributing it generously on all sides, the task of the health authorities is rendered much more difficult. With this type no certainty can be arrived at of preventing the crossing of the frontier by patients on foot or in vehicles, no matter how closely railway and steamboat international crossings and frontier trails may be watched. Moreover, of course, the period of incubation of small-pox is such that no absolute certainty of exclusion can be hoped for without a routine detention, under observation, at the frontier, of all incoming travellers. This would—needless to say—be a quite impracticable and unjustifiable interference with travel and traffic.

But, notwithstanding these possibilities of 'leakiness' in any land quarantine for this disease, much may be done at frontiers in straining out actual cases by inspection, and protecting by vaccination the unprotected who have been exposed, and thus doubly limiting the importation of fresh centres of infection into the midst of our people. Accordingly, a number of medical inspectors have been at work along our southern frontier, and also on that of Alaska.

Partly on account of small-pox in the United States generally, and partly on account of plague in San Francisco, on April 4 your ministerial order was suspended which excluded vessels from San Francisco and ports north of it from the quarantine regulations.

Small-pox was brought to the St. Lawrence quarantine by the ss. *Mont Blanc*, from Bordeaux. It was brought to William Head by the ss. *Monmouthshire* from the Orient, by the *Walla Walla* from San Francisco, and by the ss. *City of Seattle* from Skagway and Ketchikan in Alaska. The case of the ss. *Monmouthshire* was peculiar in that this vessel of the Northern Pacific Company was bound to Portland, Oregon, from the Orient, but, finding small-pox on board, her captain put in to William Head and asked for quarantine treatment there. The following extract from the Victoria *Times* will show the opinion he was led to form of your quarantine system:—

'The loss occasioned by the steamer *Monmouthshire* because of the illness of one of her Chinese passengers is estimated at $10,000, taking in customs, dockage, harbour, pilotage and other port dues, feeding and transporting the delayed Asiatics, time lost, cargo damaged, &c. There is no station at Portland, the port to which the N. P. liner was bound, and it is said, had Captain Evans taken her to the Columbia with a case of small-pox on board, he would be liable to a heavy fine and, moreover he would have been ordered to some quarantine station. That at William Head being the nearest and the most completely furnished and equipped, he decided to go there. That he was satisfied with the treatment received at the station is shown by what he has to say in the following letter:—

'"Sir,—If not taking up too much of your valuable space, I should like very much to say a word on the fumigation of the steamship *Monmouthshire* at William Head. We arrived in the harbour on the evening of the 18th instant with one mild case of small-pox on board. We came alongside the quarantine station next morning, and found everything in readiness to commence fumigation, which was a great surprise. Having been at sea for nearly thirty years, and during that time having been in ships with every contagious disease under the sun on board, and having undergone the process of fumigation in all parts of the world, and having paid a certain amount of attention to the way in which it has been done, I must say that the various ports that I have been to could take a lesson from the efficient way and the courtesy shown to all by Dr. Watt and his staff at William Head. Still there is a point which none of us appreciated very much, that was going into a hot bath at midnight, and then having to walk over rocks about half a mile at 2 a.m., with the temperature at the freezing point, to the sleeping quarters, with our beds on our backs—like the pilgrims crossing the desert to Jerusalem. At the same time this was done by my sanction, and the kindness of Dr. Watt, who already had been, to my knowledge, about thirty-six hours on his feet, to facilitate the despatch of the ship, and at the same time doing everything thoroughly. More perfect it could not have been done if we had arrived in a plague-stricken ship. As there is a quarantine station to be built at Astoria shortly, I only hope that they will have as perfect an arrangement there as here, and I feel that I cannot leave the port without thanking Dr. Watt and his staff for his courtesy and the efficient manner in which he conducted the fumigation.

'"W. A. EVANS,
'"*Master.*

'"William Head Quarantine."'

In rather striking contrast to the mildness of the type of small-pox which has been prevailing in the United States, is the virulence of the disease as introduced from the Orient in April of this year. The following extract from the Winnipeg *Free Press* gives an account of this invasion of the disease:—

'At a special meeting of the city council yesterday afternoon, the question of small-pox quarantine was considered. At the quarantine hospital they had accommodation for only five to seven patients, while there are now fifteen cases in town.

'Dr. Inglis told the story of the outbreak. On April 13, Mr. Hector Finlayson was brought to the city with what has now proved to have been a malignant type of small-pox. The physicians in attendance saw nothing to indicate the nature of the case. Some of the staff of the hospital thought the case answered to the description of a certain type of small-pox, but their ideas were laughed at. The man died on April 15, and was placed in the morgue. The smallpox incubation period is twelve to sixteen days. Twelve days afterwards, two of the nurses were taken down with a rash, and on Thursday the advice of the health department was asked. They went up and took charge of the whole hospital at once. Coming from the west on the train, a number of people had been in conversation with Mr. Finlayson and exposed to the contagion; and many of them had also developed the disease. One of these was a train boy, who was selling newspapers, &c. Another was a travelling piano dealer; and another rode from Portage la Prairie in the seat opposite the sick man. These cases of infection occurred in various parts of the city, and the exposure had been absolutely unlimited. Up to the present time he had taken charge of fifteen patients, six from the hospital and nine from outside. Regarding the steps taken to stamp out the disease, it was a little too soon yet to do very much. The first thing was to try to find out the people who had been most thoroughly exposed, vaccinate, and disinfect premises. They had isolated all houses where cases had occurred, had removed patients to the pest-house, and had given instructions to prepare accommodation for twenty more cases. It looked as if the city were in for a first-class epidemic. He was afraid the exposure had been so great that the disease had got absolutely beyond control, like the Hull fire. He could not impress it too definitely on the council that they were face to face with a very serious situation. He knew of no epidemic, except that of Montreal in 1885, which had presented so serious an aspect as this on account of the exposure, and the absolute liberty with which the persons exposed had mixed with the public. A wire was received by Mr. Wood, from Secretary Fagan, of the British Columbia board, yesterday afternoon. to the effect that Finlayson arrived on the *Empress of Japan*, on April 5. He came from New Zealand. via Hong Kong, and was going east to consult a specialist about a kidney complaint from which he was suffering. He was fourteen days on the *Empress* on the passage across, and three days in Vancouver. The man showed no symptoms of small-pox at the time. Finlayson's case is said to be a remarkable one, as he had no exterior eruption, but was taken with a hemorrhage before his death.

'From the length of time which the original case, that of Finlayson, was exposed, and the number of people who came in contact with him, both during the trip from the coast and his confinement, there are naturally a large number of suspects, and two new cases of well-known gentlemen were reported.

'The first is that of Mr. O. H. Hatcher, general agent of the Deering Harvesting Company, who Thursday last was taken into quarantine. Mr. Hatcher boarded the Canadian Pacific Railway east-bound express at Regina on the 11th inst., and travelled in the same sleeper as Finlayson as far as Brandon. He remained off one day at that point and came into the city on the 12th, and has since that time attended to the duties of his office and made several business trips to the country. The day before yesterday he felt ill, and Dr. Hutchinson was summoned Friday. That gentleman at once recognized the disease. and Mr. Hatcher was removed to the quarantine.

'Mr. Chas. H. Forrester. of the Henderson Piano Company, met Finlayson on board the train under circumstances similar to those of Mr. Hatcher. and was taken to quarantine.

'A man whose name cannot be ascertained was taken off car No. 60 of the street railway yesterday, and the company at once took that car to the shops and are having it thoroughly disinfected.

'Some ninety patients were discharged from the general hospital between the 12th and 26th of this month. and these have scattered to all parts of the province and the Territories, and some even into Ontario. Mr. E. M. Woods, of the provincial board of health, was busily engaged in wiring the local authorities at the different points at which the discharged patients are located that they—the patients—were exposed to infection by small-pox before being discharged from the hospital, and that they should be quarantined together with all persons in their present households.

'The sleeping-car on which the man Finlayson came through from the coast is the "Tokio." The provincial authorities have wired the British Columbia board of health informing them that the car is now at Vancouver, and asking them to detain it there until after it has been thoroughly cleansed and fumigated.

'The Brandon case is now pronounced to be small-pox unmistakably, and quite severe at that. A telegram was received at the provincial office yesterday morning asking whether permission would be granted to send the patient there to the Winnipeg isolated hospital for treatment. Mr. Wood replied that this could not be done, and that Brandon would have to take care of its own cases.

'The small-pox now prevalent is described by physicians as of a most infectious, malignant type of the Asiatic variety.'

In addition to the cases mentioned in this extract, others occurred also in Fort William, Port Arthur, Saw Bill, Sault Ste. Marie, Arnprior, Carleton Place and Montreal, all traceable to the Finlayson infection. Finlayson's case was indeed a remarkable one. Careful and continued inquiry led to the conclusion that he must have contracted the disease from the unpacking of infected articles during his voyage from Hong Kong. It will be noted that he was apparently quite well when he passed at quarantine, and during the three subsequent days that he spent in Vancouver before taking the train for Winnipeg.

Small-pox in the Yukon.—In July last, the commissioner of the Yukon Territory, telegraphed that smallpox had broken out at Dawson. By your instruction I at once proceeded thither. I found that the newspaper report that the disease had been brought by returning miners from Nome was not correct. All the cases were traceable to a man named Nixon, from Seattle, who had come down the river in a scow from White Horse and had gone on to the Eldorado creek. The first cases that occurred in Dawson were in the persons of two men who had come down on the scow with Nixon. The cases were seven in all, and were isolated on Dog Island, two and a half miles below the city. Recently some cases of small-pox have come down from the Forks to Dawson. These cases are doubtless attributable to the infection taken in there by Nixon.

Vessels and passengers coming up the river from Nome and St. Michaels were inspected at Dawson by the medical officer of the Yukon Council. And that Council had established a medical inspection of all arrivals from outside at their southern frontier by placing Dr. Paré, of the North-west Mounted Police, as quarantine officer at Caribou.

Mr. Ogilvie informed me that the question of a medical inspection at the frontier down the river, about 'Forty Mile', at the international frontier between the Yukon Territory and Alaska, between Dawson and St. Michaels on the Behring Sea, had been considered by the Council and held in abeyance, partly because of the protection given by the United States having quarantined at St. Michaels against all arrivals from Nome. No vessels come direct from Nome to Dawson. Seagoing steamships are required to cross the open part of the Behring sea between Nome and St. Michaels. These deep-sea vessels could not come up the shallow Yukon. Nor could the river steamers plying between Dawson and St. Michaels cross to Nome. The fourteen days of quarantine observation at Egg Island near St. Michaels of all arrivals from Nome, rendered the subsequent occurrence of small-pox contracted at Nome extremely unlikely amongst the arrivals at Dawson from down the river. I authorized the Council however, in your name, if the dire distress and disease at Nome should cause it to fear that any vessel might come up direct from Nome in the effort to get out from there before the river navigation should close, to at once send a medical inspector to examine all arrivals from below at Forty Mile.

At the other entrance—from Skagway—it was at once apparent from the Dominion standpoint that the inspection should be at the international frontier, and not only at the frontier of the Yukon Territory where alone the Council was authorized to place it, as it had very wisely done. The inspection at Caribou left British Columbia unguarded from Skagway, with Bennett, and all the Atlin and Teslin districts entered from there. Log Cabin, the first of our stations just on our side of the international line of the summit of the White Pass is evidently the proper Canadian inspecting point. The railway, the winter and summer trails converge there. There are there, and vacant, the former barracks, custom-house, and commissariat building, well adapted for hospital, doctor's residence and policemen's quarters respectively. With the consent of Major Wood, commanding the North-west Mounted Police, in the Yukon Territory, Dr. Paré was accordingly transferred to Log Cabin to inspect all arrivals over the White Pass from Skagway and the outside. Arrangements were also made for guarding the Chilcoot Pass and the Dalton Trail.

Whilst I was at Dawson, His Excellency the Governor General and Lady Minto visited that city. I officially placed my professional services at His Excellency's disposal. He was graciously pleased to accept them. I had therefore the honour of coming out with them on the return trip to Skagway as a temporary honorary surgeon on His Excellency's staff.

Transport 'Montezuma'.—On the 7th of January last I was requested by the Honourable the Minister of Militia to go to Halifax to form one of a medical board of inspection to investigate the cases of illness which had developed on the steamer *Montezuma*, and to report as to the advisability of allowing the said vessel to be used as a transport for Canadian troops for South Africa. I reached Halifax on the evening of the 9th January, and the board met the following morning. It consisted of Colonel McWalters, R.A.M.C., representing the Imperial authorities; Lieutenant Colonel Tobin, representing the Militia Department; Dr. E. Farrell, general representative; and myself, representing the Dominion Government, convener.

The board found that the *Montezuma* had left Cape Town on November 26th for New Orleans. The water on board was Mississippi river water taken below New Orleans for the voyage to Cape Town with mules and return. No water was taken at the Cape. The ship had taken more Mississippi water on board before starting for Halifax. The voyage from New Orleans to Cape Town took 29½ days. No cases of illness occurred on the way. The ship left the Cape on November 26th. What is now known to have been the first case of enteric fever (typhoid) on board reported ill on this voyage on the 12th of December. This man's illness was reported to the quarantine officer at New Orleans who thought he had suffered from malaria, but considered him fit for work. This man Kenyon was the only man off duty before reaching Halifax.

Some of the other cases that had to be taken to hospital at Halifax also date back to before the vessel reached New Orleans. They were of a mild type at first, the not unusual 'ambulatory' form, the men had not to keep their beds, and as before noted it was not recognized at the New Orleans quarantine, nor considered serious at Halifax until some days after the vessel reached that port. We found eight cases of decided enteric fever from the vessel in the city hospital. On inspecting the crew we found a ninth case, which was sent to hospital. Also eight others on board with history of diarrhœa, and with abnormally high temperatures, although still at their work : cases certainly to be regarded as suspicious under the circumstances.

I submitted to the board that in my opinion the source of infection was traceable to the Mississippi river water, or to impure water drank at the Cape, and that the cases subsequent to the first one may have arisen from such impure water, or from the first case. Assuming all these sources of infection to be accepted, still the suspicious parts of the vessel would be confined to the water in the tanks, to the crew, and the parts of the vessel they had occupied. That in my opinion the crew, from the captain down, should be taken out of the vessel; all fresh water tanks be emptied, disinfected by steam and refilled with fresh water; and the vessel taken to quarantine and all apartments, latrines, etc., thoroughly treated there. That if that were done I considered any recurrence of the disease in the highest degree improbable.

The other three members of the board, while recognizing the value of modern methods of disinfection, were unanimously of the opinion that the report of this board should be a recommendation to the government against the use of the ss. *Montezuma* as a troopship. Surgeon-Colonel McWalters dwelt specially on the point that the occurrence of even one case amongst the troops might cause their delay at the Cape or in camp in quarantine at a time when it might be vital that every man should be hurried to the front. He was emphatic in the unqualified condemnation of this vessel, and expressed confidence that that course alone would be approved by the Imperial authorities. In this view he was supported by Dr. Tobin, as representing the Militia Department, and by Dr. Farrell, as representing the general public.

Many years' experience of the appliances of your quarantine system, and repeated perfect success with much graver infections than that of enteric fever, justify my confidence that there is no vessel, however infected, that cannot be rendered perfectly safe by the proper use of our modern appliances. And as a matter of fact it may here be stated that inquiries have proved that no further case of enteric fever developed on the *Montezuma* after her disinfection at Halifax.

But I need hardly add that I fully recognize that it would not have been right for the Government to act on my minority report in face of the strong objection to the employment of the vessel as a troopship under any circumstances, held by the other members of the board and—to judge by the newspapers—very generally by the public also.

Samples of the water in the tanks were sealed up and sent to Montreal for bacteriological examination, and the typhoid bacillus was found in it by all the standard tests.

It would seem likely, from the history of the vessel, that there were a few micro-organisms of this disease in the water taken below New Orleans, and that they increased and multiplied in the tanks, under the favouring conditions of the darkness, and of the heat in twice crossing the equator.

The Epidemic Dysentery of Japan.—Dr. Stuart Eldridge has submitted to the surgeon-general of the marine hospital service an interesting report (*Public Health Reports*, January 5, 1900) on the severe epidemic of dysentery which has been prevailing in Japan for the past twenty years. Beginning in 1878 in the south, the disease has gradually spread from island to island until it has invaded practically the whole extent of the Japanese empire. It has been attended by a very high mortality, and this mortality throughout the whole epidemic has been remarkably constant. The total number of reported cases is 1,136,096 with 275,308 deaths, the percentage for the whole period being 24·23. In some periods the mortality has risen as high as 27 per cent. So far but little success, according to Dr. Eldridge, has attended the efforts of the officials to control the disease or to limit its extension. Recently the general government has taken the matter out of the hands of the local authorities, and in consequence the prospect of thorough sanitary control is brighter. The chief difficulty in Japan, as in so many other oriental countries, is the absolute ignorance and indifference of the populace. The people pollute the streams by throwing the dejecta into them, and then drink from these contaminated sources. It is gratifying to know, however, that the Japanese, who are reputed to be a bright people, are beginning to appreciate the fact that the sanitary regulations of the government are for their good.

The disease itself is evidently a virulent form of bacterial infection. It is attended by bloody and purulent discharges which are the evidences of an acute catarrhal and ulcerative process in the colon and rectum especially. A nervous type of the disease is seen, in which the patient is overwhelmed by systemic intoxication. The Japanese pathologists, Kitasato, Shiga, and others, have studied the disease with scientific care and accuracy. Shiga has published in the *Centralblatt für Bacteriologie*, Band xxiv., the results of his studies. He believes that he has found the specific cause of this epidemic in a short rod of about the same size as the *bacterium coli communis* and morphologically very similar to the bacillus of typhoid fever, but not identical with either. Shiga has prepared an antitoxic serum which has proved successful, reducing the mortality as low as 8 per cent, while hospital cases under the ordinary medical treatment were giving a mortality as high as 37 per cent. The cost of the serum is the great obstacle to its extended use. Dr. Eldridge, in conclusion, states the reasons for believing that this epidemic dysentery is distinct from both plague and cholera ; it is also not to be confused with ordinary amebic dysentery.

Protective Inoculations for Enteric Fever.—Numerous efforts have been made to obtain a serum capable of conferring immunity to typhoid fever and of exerting a curative influence on the developed disease, but hitherto without satisfactory evidence of success. Inasmuch as the disease is one of which an attack confers relative protection from subsequent attacks, it does not seem unreasonable to hope that we shall eventually come into possession of an effective antitoxin. Although the lower animals are not susceptible to typhoid fever as commonly observed in human beings, there develops in them a form of septicemia, to which, however, immunity can be induced by the use of heated cultures of typhoid bacilli or of the filtrate from unheated virulent cultures, or of cultures in thymus-bouillon. Some attempts made by A. E. Wright, professor of pathology in the Army Medical School, at Netley, England, in conjunction with successive associates, to produce these results in human beings would seem to have attained a measurable degree of success, and they are particularly interesting at this time from their bearing on the vaccination by the same method of recruits for the British army in South Africa. In the latest communication on this subject, Wright and Leishman describe the method for obtaining the vaccin and the results of its employment, in so far as these can at present be estimated. The inoculations were made on troops in India, the vaccin being largely prepared as required. This consisted in part of a four-weeks-old culture of virulent typhoid bacilli, with 1 per cent of lysol, sterilized by exposure to a temperature of 60 C., or of a twenty-four-hour-old culture, the dose of the former employed for each inoculation being from ·5 to ·75, and of the latter from ·3 to ·5 c.c.—the minimal fatal dose for 100 grams of guinea-pig; 2,835 men were inoculated. Among these there occurred twenty-seven cases of typhoid fever (·95 per cent) with five deaths (2 per cent), as compared with 213 cases (2·5 per cent) and twenty-three deaths (·34 per cent) among 8,460 uninoculated persons. These results become the more conspicuous from the fact that the inoculated included principally young and unseasoned men, while the uninoculated included older and more seasoned ones.

Again, the official statistics with regard to the results obtained in the beleaguered military garrison at Ladysmith, as cited by Wright (*Lancet*, July 14, 1900, p. 95), show that among 10,539 non-inoculated individuals there occurred 1,489 cases of typhoid fever—a proportion of 1·707; with 329 deaths—a proportion of 1·329 of the whole number, and of 1: 4·52 of the number of cases ; while among 1,705 inoculated individuals there were thirty-five cases of typhoid fever—1: 48·7; with eight deaths—1·213 of the whole number, and 1·4:4 of the number of cases. Briefly stated, the figures demonstrate an almost sevenfold reduction in the morbidity and in the total mortality among the inoculated, with little alteration in the case mortality, but this latter fact may be in some degree dependent upon the small number of cases dealt with. It has further been reported that the disease pursued a milder course in the inoculated than in those not inoculated. There was no reason to believe that the remaining conditions to which inoculated and uninoculated were respectively exposed exerted any noteworthy influence upon the result. While perhaps these observations can not be looked on as conclusive, they indicate at least the harmlessness of the procedure employed, and they justify the hope that we shall soon have a means of diminishing the prevalence of, as well as reducing the mortality from, enteric fever, just as these things have been done for small-pox, for hydrophobia and for diphtheria.

Beri-Beri.—C. Norman enumerates and discusses the following features of beri-beri:—Disturbances of sensation, exaggerated reflexes, later diminished; paresis of the peroneal muscles and foot flexors, affections of other muscles, eye symptoms, absence of sphincter paralysis, later muscular atrophy; joint relaxation, cardiac palpitation, gastric weight and discomfort, and finally œdema. The great danger always present in this disease is sudden heart failure.

According to Manson, beri-beri is a place disease. Overcrowding seems to favour the outbreak of the disease, such conditions create an incubator on a large scale, which should it chance to contain a beri-beri germ, quickly becomes extensively infective and lethal. He does not think, however, the germ lives as a parasite in the human body, or that it exercises its pathogenic powers in a direct way, or that it passes from one human being to another, like the germ of the ordinary infectious or directly communicable disease. He suggests it is possibly caused by a toxin generated by a germ living in the patient's surroundings.

Yellow Fever.—The experiences and reports of the year have been on the whole adverse to the claims for Santorelli's *bacillus icteroides* as the causative micro-organism of this disease, and for his serum as a preventive or curative agent. During the year a fresh claimant for this honour has appeared in Dr. Angel Bellinzaghi, as is shown by the following which has been published as a Mexican cable to the *New York Herald*:

'Dr. Angel Bellinzaghi, a well known physician in Brazil, has discovered a new serum which is believed to be efficacious against yellow fever. The serum was tested successfully on several cases in Rio Janeiro.

'Dr. Bellinzaghi arrived in this city last week and began treatment on David Kilpatrick, a patient in the American Hospital here. In Kilpatrick's case the serum was injected at the end of the fourth day. It is announced that he will recover.

'Dr. Bellinzaghi has arranged with the government to try the serum in Vera Cruz, where an epidemic of yellow fever is now raging, as well as in Coatzacoalcos and the Isthmus of Tehuantepec.'

Leprosy.—Dr. Fox, of New York, adds his testimony to that of so many others, as to the value of chaulmoogra oil as a remedy in this disease.

Dr. Ehlers, of Copenhagen, has during the year reviewed the subject of the mercurial treatment of leprosy, and gives some curious and interesting historical details, including a reference to the Icelandic practitioner, Jon Pjétursson, who in 1769 wrote a book in Danish to explain his treatment of 'Iceland scurvy', that is, leprosy, by means of mercurial preparations given by the mouth. Coming to the more recent attempts to deal with leprosy by intramuscular injections of perchloride of mercury, made by Radcliffe Crocker and Haslund, both of whom have had encouraging results up to a certain point (the former in several cases, the latter in one only), Ehlers states that Bjarnhjedinsson and Bjornsson in Iceland have also obtained satisfactory results on these lines. This is further confirmed by Neish in his report on the Lepers' Home (Jamaica, 1899), who has applied Radcliffe Crocker's method to 66 selected cases of leprosy, those suffering from nephritis or cardiac complications being excluded. Neish is reported as stating that in every case the effect has been most strikingly beneficial, and in his conclusions briefly summarizes the results, observed as follows : Restoration of sensation, disappearance of the nodules, rapid cicatrisation of ulcerations, improvement in the general mental attitude in the direction of cheerfulness, etc. Neish proposes to pursue the experiment.

Darcy Island.—Whilst in British Columbia this summer I visited the leper establishment at Darcy Island unofficially. There are five lepers there, all Chinese males. One is maintained by the province, and one each by the municipalities of Victoria, Vancouver, Nanaimo and Kamloops.

Transmission by Insects.—In connection with the recent theories as to the transmission of plague by fleas from rats, and of yellow fever as well as malaria by the musquito, Nuttall's observations are of interest. He reports tests (*Cbl. f. Bakt.*, xxxiii, 15) which show that when bedbugs and fleas bite, by their sucking they remove any micro-organisms that may be introduced by their bite. But infection may occur if the insects are crushed on the skin and the bitten spot scratched.

The Public Works (Health) Act.—His Excellency the Governor General in virtue of the provisions of this Act and with the advice of the Queen's Privy Council for Canada has been pleased this year to make regulations for the preservation of health and the mitigation of disease among persons employed in the construction of public works. The carrying out of these regulations to be under your administration, and any act of the Health Board to be subject to your revision.

The regulations defining the constitution of the officers and health board are as follows:

There shall be appointed by the Governor in Council a superintendent under the said Act, whose duty it shall be—

(*a*) To see that the regulations under the said Act are enforced and complied with on every 'public work' or 'works' to which they are applicable.

(*b*) To report and recommend from time to time such additions and changes in said regulations as shall the more effectually promote and secure the intent and object of the Act.

(*c*) To act as chairman when present at all meetings of the health board.

(*d*) To notify the chief provincial health officer from time to time of all cases of contagious or infectious diseases on any 'public work' or 'works.'

(*e*) To receive reports from the medical staff engaged upon the work.

All matters of importance under the Act shall be reported by the medical officer to the superintendent.

The health board shall consist of the superintendent, all medical men engaged on the said 'public work' or 'works,' the government engineer in charge of the same, and in his absence any government engineer engaged on the works, or designated by the governement.

A quorum of the health board shall consist of at least three members, of whom in the absence of the superintendent the government engineer in charge or other government engineer on the works or other engineer as the case may be shall be one, provided that where two medical men cannot conveniently meet an additional government engineer may complete the quorum; provided that any act of the board shall be subject at all time to be revised or superseded by the Director-General of Public Health on reference from the superintendent.

Official Inspections, etc.—On January 8, I proceeded to Halifax, as above detailed, for the inspection of the proposed troopship *Montezuma.*

While at Halifax I had opportunities of inspecting the quarantine station at Lawlor's Island.

Returning by way of St. John, N.B., I inspected the quarantine station at Partridge Island.

On May 3, I went to Quebec to inspect the steamers *Kathleen* and *Contest*, and report to you upon their respective suitabilities as a disinfecting, etc., steamer for the St. Lawrence quarantine.

On July 24, I started for Dawson, as above mentioned, going by way of Vancouver. Returning, I reached Victoria on September 1, and inspected the quarantine station at William Head. I visited Seattle, to study the small-pox situation there. Thence I passed by Huntingdon, and along the frontier inspection posts, between British Columbia and the United States. I came in by the Crow's Nest Pass to Winnipeg, and reached Ottawa again on September 26.

On October 20, I left to attend the annual meeting of the American Public Health Association, held this year in Indianapolis, Indiana. The meeting was a valuable and instructive one, many sanitarians from the United States, Canada and Mexico being present.

In returning, I visited the New York quarantine, and through the courtesy of Dr. Doty, saw the new improvements there.

THE QUARANTINE STATIONS.

Grosse Isle.—At Grosse Isle, Que., in the St. Lawrence, and at its sub-station of Rimouski, Que., 407 vessels have been inspected this year, 374 at Grosse Isle and 33 at Rimouski. The number is less than in previous years. Each large vessel now being built represents a carrying capacity of several of the smaller ones formerly employed. There were 5,000 more passengers inspected than last year. Admissions to hospital 40: deaths 2, 1 from small-pox, 1 from enteric fever. The works for the introduction of a water supply for the hospital were commenced.

William Head, B.C.—Some 23,000 Chinese and Japanese passengers have been bathed at this station this year and their effects disinfected. Observation and disinfection at the ports of departure, long hoped for, is being inaugurated. Number of vessels inspected 360. Diseases : small-pox, dysentery, beri-beri and diarrhœa. One death from small-pox, one from diarrhœa.

Victoria, B.C.—Since May 3, your ministerial order has been suspended which excepted vessels from San Francisco and ports north of it in the United States from the provisions of the quarantine regulations. All vessels arriving at Victoria even the daily boats from Puget Sound ports and from Alaska have therefore been inspected. This was rendered necessary by the presence of bubonic plague in San Francisco, and small-pox in the neighbouring states.

Vancouver, B.C.—At this port 223 vessels were inspected, including some from neighbouring United States ports since May 3. Small-pox was found on the ss. *City of Seattle,* from Skagway and Ketchikan, Alaska. This vessel was accordingly sent to the William Head station, for observation and disinfection. Her passengers are still under observation there.

Halifax, N.S.—Vessels inspected 329; an increase of 43. A 40,000 gallon tank has been installed at the highest point of this station for flushing, supplying baths, etc., with salt water. This will make drainage possible. The steerage building put up for the Doukhobors near the first class building has been converted into a detention building for intermediate passengers.

St. John, N.B.—176 vessels inspected, an increase of 33 over last year. Enteric fever and diphtheria were found amongst the arrivals. The new buildings at this station are now ready to be furnished. Action has been taken for the completion of the water supply.

Sydney, C.B.—Vessels inspected 168, no infectious disease.

Charlottetown, P.E.I.—Vessels inspected 11, no infectious disease.

Chatham, N.B.—Vessels inspected 102, no infectious disease.

Leper Lazaretto, Tracadie, N.B.—Four deaths during the year, and three new admissions. The present number of lepers in this institution is 20; 13 males and 7 females. Dr. Smith has noted encouraging results from his trials this year of chaulnoogra oil and creolin.

I have the honour to be, sir,

Your obedient servant,,

F. MONTIZAMBERT, M.D. Edin., F.R.C.S., D.C.L.

Director-General of Public Health.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 2.

OFFICE OF THE MEDICAL SUPERINTENDENT,
GROSSE ISLE, QUE., October 31, 1900.

SIR,—I have the honour to submit my annual report of the St. Lawrence Quarantine Service to October 31, 1900.

Three hundred and seventy-four (374) vessels presented themselves for the inspection at this station during the present year.

This number of vessels inspected shows a decrease over the last year, owing to the fact that many steamers coming generally by this route have been chartered by the British government for transportation of troops, munitions, &c., to South Africa; and also, that many having stopped at Sydney, N.S., to take coal, had received their clearance from that port before passing here.

But, although the number of vessels has decreased, the number of passengers inspected shows an increase of more than five thousand (5,000) over the last year.

We have examined 45,187 persons in all, divided as follows:—4,202 cabin, 4,838 intermediate, 17,738 steerage passengers and 18,409 crew.

The only vessel that seems to call for special remarks is the following:—

The ss. *Montblanc*, Cronzat, master, having sailed from Bordeaux (France) on June 24, with 2 cabin, 229 steerage passengers and 35 crew, arrived at the station on July 10, at 11 p.m.

On her arrival, the captain and surgeon having reported cases of small-pox, the steamer was stopped until daylight of the next morning to be inspected.

We went on board early on the morning of the 11th, and on inspecting the hospital, which was placed on the 'bridge deck,' and isolated from the part occupied by the rest of the passengers only by a slight partition of board, we found that there were five persons of the same family, including the father, the mother, one girl aged ten years, one boy aged seven years, and a little baby aged six months, and three of them, the father, the girl and the boy, were taken with confluent hemorrhagic smallpox, and were in the full period of eruption of the disease.

The captain and surgeon declared more, that one girl, aged eighteen years, of the same family, died of that same disease during the voyage, and was buried at sea.

The record of voyage shown to us stated that the first case developed on July 4, and the other ones on the 5th, and it is really surprising that the disease did not spread more, considering that the surgeon on board had no vaccine at his disposal, and that not one of the passengers and crew had been vaccinated before or after embarking.

We ordered the captain to have his steamer anchored near the station, and having removed the sick to the hospital, we began immediately the landing of passengers, with their baggage.

The vaccination, the disinfection of baggage, clothes, bedding, &c., with steam disinfector and formaldehyde took place on the 12th, and on the same day we gave the needle baths with antiseptic solution of chloride of mercury.

The disinfection of the steamer began on the 13th, the methods employed being formaldehyde, steam, mercuric chloride solution and sulphur dioxide gas, under pressure from blast furnace.

I beg leave to say here that the sulphur dioxide blast disinfecting appliance, installed on ss. *Kathleen*, has been a great convenience for the disinfection of that part (bridge deck) occupied by the sick and the passengers. After having pulled down the wooden beds, to be landed and burned, we introduced into one of those compartments measuring 16,907 cubic feet, one hundred and fifty pounds of sulphur, and in the other one, measuring 6,431 cubic feet, 65 pounds, making about ten pounds per 1,000 cubic feet.

The disinfection of the steamer was completed on Sunday, the 13th, and a telegram was immediately sent to the agents in Montreal and Quebec, stating that the steamer, having been disinfected in every part, could proceed if they sent a new crew to take charge of her, but Mr. Poindron, the agent in Montreal, replied that the owners and insurers of the ss. *Montblanc*, which had been chartered by the 'Compagnie Franco-Canadienne,' would not allow their steamer to proceed with a new crew, unless their captain and chief engineer be on board, and asked me under those peculiar circumstances to release those two officers; so I wired that fact to the department, to be advised and relieved from all responsibility, pointing out that, if permission was given to those two officers to proceed without having completed the full period of observation, the rest of the crew and passengers could and would not understand and accept that preference and distinction, and it would be a dangerous precedent; the answer to my telegram being that there could be no distinction made with regard to infectious disease; captain and engineer were just as dangerous as any one else, and should undergo same observation, so the steamer could not and did not proceed before the crew had completed the full period of observation.

On the 16th, one of the sick in the hospital, the girl aged ten years, died from infectious endocarditis (complications of small-pox), and the little baby, aged six months, presented symptoms of fever, and 6 days after he was in the full period of eruption of smallpox.

On the 22nd, one of the passengers (woman) detained as suspicious, and who had been vaccinated successfully twice, the first time on the 11th, and the second time on the 17th, complained of pain in the abdomen and presented some rash on the skin, so we removed her from the upper division to the hospital for observation, and on the 25th, the rash having increased and presenting all the appearances like, we diagnosed it as a case of varioloid.

As that woman had had communication with some of the passengers, we began again the disinfection, the bathing, &c. We drenched, with a solution of chloride of mercury, the sheds occupied by them, and they were detained seven days more in observation.

The passengers and crew which had been detained as suspicious, having been vaccinated and bathed, and their baggage, clothes, &c., disinfected, left the station—crew with the ss. *Montblanc*, on July 31, and passengers with the tug *Beaver*, on August 6.

The convalescents were discharged from the hospital at quarantine, and left the station on September 18.

Infectious diseases of minor importance were reported or found on board of the following vessels:—ss. *Lake Superior, Parisian, Tunisian, Tritonia, Lake Megantic, Corinthian, Numidian, Devona, Bengore Head, Torr Head.*

The diseases so reported and discovered were scarlet fever, measles, chicken-pox and enteric fever. All those sick were removed with attendants to the hospital, and the vessels proceeded, after having had their hospitals disinfected.

The admissions to hospital numbered 40.

The deaths numbered two, one from small-pox and one from enteric fever.

The ss. *Lake Superior* landed for burial at quarantine the body of a child, who died shortly before from bronchitis.

BUBONIC PLAGUE.

In accordance with instructions from the department, we have made careful inspection of vessels coming from Glasgow, owing to the outbreak of the bubonic plague at that place. In order to make the most rigid and careful inspection, all vessels arriving from that port at night were directed to anchor and await daylight to allow the examination of every one on board.

SS. *Buenos Ayrean*, having sailed from Glasgow on September 8, arrived at the station on the 20th, with 11 cabin, 91 intermediate and 121 steerage passengers. Owing to the great number of passengers she carried and to the date of her sailing, which corresponded with the time that the disease spread so much in Glasgow, this vessel was detained three days under observation to complete the fifteen since the last exposure, and she was released on September 23.

Acting under instructions from the department, all vessels from Glasgow via Sydney, N.S., were reinspected here owing to the long distance between that last port and Quebec.

QUARANTINE STAFF.

The Rimouski substation continued to be in charge of Dr. A. Lapointe, who made the inspection of the weekly mail steamers.

I visited from time to time this advanced post, and coming up on the mail steamers I inspected them thoroughly en route between Rimouski and Grosse Isle.

The number of staff at Grosse Isle had also to be increased to meet the larger addition of work during the year.

IMPROVEMENTS AND REQUIREMENTS.

The ss. *Kathleen*, hired by the department this year, has proved to be of great convenience and necessity to act as mail and supply boat between the station and Quebec; to convey passengers discharged from the hospital at quarantine, to carry the sulphur furnaces out to fumigate infected vessels, and most important perhaps of all, to act as a reserve inspecting steamer in place of *Challenger*.

I beg leave therefore respectfully to suggest that you should build or purchase one steamer with screw, if possible a duplicate of *Challenger*, because it is very inconvenient and dangerous in rough weather or at night to come alongside the steamers with a paddle boat.

It would be greatly in the interest of the shipping, as well as of all concerned.

The great deficiency continues to be that of a deep-water wharf, a wharf to which infected vessels would be brought to land their passengers and baggage for disinfection.

During the present year many works and repairs were made at the station, and I may perhaps be permitted to express here my satisfaction to see that the waterworks for the hospital are begun; this is certainly one great improvement in the interest of the sick and of the station.

One of the most important wants for the hospital should be to have one steam laundrying disinfecting apparatus, so as to prevent the spread of the different diseases by the upholding or the washing of dirty or contaminated linen, and to sterilize the baggage, bedding, clothes, &c., belonging and having served to the sick and attendants removed to the hospital.

There are still some other works and repairs absolutely necessary which have been asked, and the list for which is in the hands of the Public Works Department.

The whole respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

G. E. MARTINEAU, M.D.

To the Honourable
The Minister of Agriculture,
Ottawa.

No. 3.

QUARANTINE STATION,
HALIFAX, N.S., October 31, 1900.

SIR,—I beg to submit my annual report of the work done at this station during the year ending October 31, 1900.

We were entirely free from the graver forms of quarantinable diseases at this station during the year just closed, and we only met with a few cases of the minor forms.

On January 1, the ss. *Montezuma* arrived in port from Cape Town, South Africa, via New Orleans, with a case of enteric fever on board. By the 10th of the month nine cases had broken out amongst the crew.

The facts of the case are as follows: One of the crew took sick on the coast of Africa on the voyage from Cape Town to New Orleans. When the ship arrived at the latter port, the quarantine officer examined the patient carefully, and found his temperature registered 100° Far., but he did not anticipate anything very serious being wrong with the man, and he admitted the vessel to free pratique, and subsequently gave her a clean bill of health. While in New Orleans they filled one of the tanks with Mississippi water for drinking purposes. Thence the ship sailed for Halifax on December 23, 1899, and arrived here on January 1, New Year's Day. No one complained of being ill when they arrived in port except the one man. It being New Year the day the vessel arrived in port, each of the crew was given a sovereign, and most of them came ashore and had a regular blow out, and as a result some slept all night in a snow bank. A day or two later two or three of them took sick from exposure, as the captain thought, but their sickness lapsed into typhoid fever. All those who took sick occupied the forecastle except two. At first it was thought the disease originated from the drinking water which was taken from the Mississippi and might have been infected. But this could not be so, for from 90 to 100 mechanics who were fitting up the ship drank the same water for seven or eight days, and none of them contracted the disease. In view of this fact, and also of the fact that all the sick except two lived in the forecastle, we came to the conclusion that the water was not at fault. I am satisfied that the disease came from South Africa, and that it spread in the forecastle by contagion.

The vessel was disinfected in the following manner: The mattresses in the forecastle were destroyed, and the forecastle disinfected with formaldehyde gas and flushed with mercuric chloride solution, 1 in 800, as was also all the apartments occupied by the sick. The bilges were flushed with sea water and pumped dry, after which they were freely flushed with mercuric chloride solution, 1 in 800. This solution was left in the bilges for some time. The water tanks were emptied and subjected to the action of steam for eight or nine hours. They were then filled with fresh water.

When the vessel left port for New Orleans I gave her a clean bill of health, and I have since made inquiries and I feel pleased to be in a position to state that no case of fever developed after the vessel was disinfected.

The ss. *Cambroman* arrived from Liverpool on April 9, with a case of enteric fever on board; the ss. *Assyria*, from Hamburg, May 18, had four cases of scarlet fever amongst three Galician families. These, with their respective families, were sent to Lawlor's Island, and were kept there till desquamation had ceased. One family was detained there for six weeks. No new case originated in quarantine.

One death occurred, that of a child, who was all but dead when he arrived in port. They were all bathed and their effects disinfected before being discharged. On June 25 the ss. *Swanley*, from Florida, arrived with the captain sick with typhoid fever. He was sent to the V. G. Hospital for treatment. The schooner *F. B. Wade*, from Antigua, W.I., August 12, reported one death from pulmonary tuberculosis on the voyage. The ss. *Arcadia*, from Hamburg, June 2, reported six deaths from broncho-pneumonia on the passage, and the ss. *Numidian*, from Liverpool, March 26, and the schooner *Wanola*, from Philadelphia, March 29, reported each a death from pneumonia.

A few cases of tinea favosa arrived amongst the immigrants from Europe, but as there is nothing in the quarantine regulations prohibiting persons suffering from this disease from entering Canada, they were allowed to land. Some of these were bound for the United States, but the United States immigration commissioner at this port would not allow them to proceed, so they were stranded here. The agents of the ships, however, looked after their welfare.

The number of vessels inspected at this station during the year was 329. This is 43 in excess of last year. This shows that the station is growing in importance yearly; 31,189 were examined, as follows:—Cabin passengers, 1,427; second-class, 1,611; steerage, 16,057; crew, 11,666. This is only an excess of 202 souls over the previous year.

The following improvements were made at the station during the year:— A concrete tank, with a capacity of about 40,000 gallons, was constructed on the highest point on the island, and connected by pipes with the different buildings, and with the force pump in the disinfecting house. This enables us to use sea water for flushing and baths, and so saves the well water for drinking and culinary purposes. We need a few more surface wells.

The temporary building erected in February, 1899, to accommodate the Doukhobors was converted into a first-class building for intermediate passengers, and a road was constructed from the south-east corner of the disinfecting house to connect with the two steerage detention buildings. This enables us to convey the disinfected effects from the disinfecting house to the detention buildings without mixing up, as in the past, with the infected effects.

The following vessels have arrived from Glasgow since the outbreak of bubonic plague in that place:—The ss. *Siberian*, on September 15 and October 29; the ss. *Cartaginian*, October 2; the ss. *Assyrian*, October 6; the ss. *Corean*, October 15. Each of these vessels were examined in daylight in mid-stream. No sickness was found on board of any of them. In every instance funnels were used on the hawsers after the vessels docked, and when it was found necessary to keep a gangway open at night, a man was kept watching it to see that no rats left the ship. I found the agents of these vessels most anxious to carry out all the regulations issued by the department.

We have distributed Danysz rat virus along the public wharfs and buildings on two different occasions. The food used was loaf bread, and it was prepared in every detail according to the directions accompanying the virus. The first was distributed four weeks ago, and the second two weeks later. I have carefully watched the results, and I must say they have not been very satisfactory. No dead rats have been seen lying about wharfs or public buildings, and in only one or two instances was there any apparent diminution in the number of rats usually seen about these places.

To make the station still more efficient, I would recommend that the following additional improvements be made:—That a covered passage-way be built behind the disinfecting house, extending from the bath-house to the south end of the disinfecting house, so that the bathed could leave the bath-house without having to mix up, as at present, with the unbathed and their infected effects. I would further recommend that a fence be built from the south-east corner of the disinfecting house, extending up the hill between the two steerage detention buildings, to connect with the fence across the road leading to the hospital. If this was done, one of the buildings could be used for the reception of the immigrants, with their infected effects, while the other could be used for the reception of the bathed and their disinfected effects, and no intermingling of the bathed and unbathed and their infected and disinfected effects would be allowed till disinfection is complete. By such an arrangement as this disinfection could be carried out scientifically, but not otherwise.

There is one other matter to which I desire to call your attention, and that is the use of cesspits at the station for the reception of human excreta. Cesspits are condemned by the best authorities on sanitary science. In the event of the graver forms of quarantinable disease appearing on the island, these pits would become pest holes for propagating disease. The buildings should be drained into the harbour.

I have the honour to be, sir,
Your obedient servant,

N. E. MACKAY,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 4.

Sydney Quarantine Station,
North Sydney, November 3, 1900.

Sir,—I have the honour to present my report for the year ended October 31, 1900.

The number of vessels inspected this year exceeds that of any year since I have taken charge of the quarantine station here.

A new feature in the quarantine work at this port is the arrival of a large passenger list on a number of the different steamships calling here.

The total number of ships inspected for the year now ending number 168.

Steamboats, 138 ; sailing vessels, 30 ; transatlantic, 117 ; cisatlantic 51.

I am glad to say that there has been no case of quarantinable disease in this port during the year.

All ships have as usual been carefully inspected, particularly those from Glasgow, since the bubonic plague has been reported there. The buildings, &c., at the station are in good condition.

I have the honour to be, sir,
Your obedient servant,

HORACE RINDRESS, M.D.

To the Honourable
The Minister of Agriculture,
Ottawa.

No. 5.

QUARANTINE,
St. John, N.B., October 31, 1900.

Sir,—I have the honour to submit my report for the year ending October 31, 1900.

One hundred and seventy-six vessels have been inspected. This is an increase of thirty-three over the previous year.

On December 3, the brigantine *Culdoon* arrived from Malta in a dirty condition and infested with rats. She was held and disinfected as a precaution against the plague. Pratique was granted December 4th.

The ship *Lennie Burrill* arrived from Buenos Ayres on December 18. She was held and disinfected as a precaution against plague.

At the inspection of the crew of the ss. *Alcides*, which arrived from Glasgow February 9, one seaman complained of dizziness and diarrhœa. His temperature at the time (10 a.m.) was 102° F., and his pulse 102. He was isolated and re-examined at 4 p.m., when the temperature was 103° F. and the pulse 108. Other symptoms pointed to enteric fever as a probable diagnosis. The patient was sent to hospital ; the forecastle was thoroughly cleansed and disinfected ; the water-closets scrubbed and painted, and the water-tanks emptied, disinfected and re-filled. The ship was not detained. The diagnosis proved to be correct. There were no other cases.

SS. *Sylviana*, which arrived from London, March 14, presented a case of diphtheria in the person of the 3rd officer. The patient was isolated, and under antitoxine made a rapid recovery. Preventive measures were successfully applied. The ship was not detained. A case of tuberculosis in the person of a fireman on the same vessel was sent to the General Public Hospital for treatment.

On May 21, the ss. *Nile* arrived from Baltimore with eight cases of itch among the crew. At the request of the master, I intervened with our sanitary appliances and cut the epidemic short.

On May 28, the ss. *Tiber* arrived from Demerara and the West Indies. The mate reported that the master, Captain Delisle, had died nineteen hours before reaching port, and that his body was still lying in his room on the bridge deck. Careful investigation revealing no evidence of contagious disease, I granted pratique, and also, on the receipt of instructions from the department, gave permission to land the body in a sealed coffin for removal to his late home in Quebec, for burial.

The very next vessel to arrive also reached port with the dead body of her former captain on board. This was the barque *Scillin*, which arrived from Genoa on May 30. The mate reported that Captain Schiaffino had died at 5 a.m., May 29, after five days' illness. The history elicited at my examination was clearly that of apoplexy. There was no evidence of any contagious disease. I granted pratique and gave permission to land the body for burial.

On June 12, the barque *Luigina* arrived from Rotterdam. One of the seamen presented an axillary bubo of a suspicious character. The vessel was detained until the completion of a bacteriological examination of pus from the bubo determined the absence of the bacillus pestis. The case proved to be one of staphylo-coccus infection.

On September 14, the ss. *Tanagra* from Glasgow, was detained, disinfected and her crew bathed, as a precaution against the plague. Pratique was granted the next day.

Twenty-eight cases of tuberculosis and thirty-two cases of venereal disease have also been observed on ship board during the year.

During the course of the annual meeting of the Maritime Medical Association held this year at St. John, July 17-19, the members were given an excursion to the quarantine station on the afternoon of July 18. Eighty members attended. Luncheon was served in building B, by the kind permission of the contractor, and in the speeches which followed were many favourable comments on the character of the buildings which are being erected here.

The recent growth of the shipping trade at this port and particularly the advent of transatlantic lines of steamships carrying passengers, compelled the erection of quarantine buildings of a suitable character. Preliminaries having been arranged and money cheerfully granted for the purpose, ground was broken for the foundation of a new hospital on November 14, 1899. This building, as well as a new building to accommodate the officers and crews of detained vessels, and a detention building for immigrants are now completed and ready to receive furniture and fittings which have been ordered for them.

A contract has been given to Mr. D. P. Kent to sink an artesian well at this station. This is a most important work, the beginning of which has been delayed in part at least by the discouragements gratuitously bestowed by some whose interests in securing a suitable water supply are hardly as great as are those of us who would be held responsible for its absence in the time of some grave emergency. I confidently look for a successful outcome to the experiment, which is shortly to be begun.

The necessity for telephone communication between the station and city having become recognized, five thousand feet of deep sea cable were procured from the Department of Public Works through the courtesy of the Honourable Minister. This was put down between Partridge Island and Fort Dufferin on December 7, 1899, by Mr. Douglas Wetmore, and a crew from the staff of the Western Union Telegraph Company. Authority having been secured, a contract was made with the New Brunswick Telephone Company to erect and maintain the land line between the Fort Dufferin end of the cable and their control exchange, and to install and maintain two telephones at the station. The work was completed on March 24, 1900. It has proved of great value not only to your officer and service here, but it has also been freely and frequently used by officers and employees of the Departments of Marine and Fisheries and Public Works, and by pilots, shipping and newspaper men, contractors and merchants.

During the year extensive repairs have been made to the quarantine officer's residence and a hot water heating apparatus has been placed therein. These improvements and additions have added greatly to the appearance of the building and to the comfort of those who reside there. I congratulate the department on the first named result and sincerely thank them for the second.

Generally, the year has been one of progress here, and I think that its outcome should be accepted as satisfactory. Though continually threatened by grave contagion, none has entered the port. Our opportunity for preparation has been extended and we have fairly availed ourselves of it. Before, however, we can claim to be fully equipped, a water supply, and a wharf to which vessels requiring disinfection may be brought, must be provided. The plan to be followed in securing the first of these has been adopted and will doubtless be carried to a successful issue. The second is still under consideration, but I hope the work begun here will not be allowed to end until a suitable and permanent quarantine wharf has been provided.

With the approval of the St. John Board of Health,—before whom, on invitation, I appeared and explained the character, use and purpose of the Danysz rat virus,—I began a campaign against the rats along the harbour front on Monday, October 22. A second and third baiting of the wharfs and warehouses will be practised, but the rats are so numerous that even though thousands of them should be destroyed, thousands will still remain, and the virus would have to be exhibited again and again before we could hope to rid the water front of them.

Many applications for the virus have been received by me from hotelmen, marketmen, grocers, merchants and residents of the city, but, as the supply sent me is limited, and intended for a specific purpose, I have not felt that I could divert any of it for the benefit of the individual citizen. A further and separate report will be made by me on this experiment.

The special instructions which have been received by me from time to time during the year have been carefully observed.

I have the honour to be, sir,
Your obedient servant,

J. E. MARCH, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 6.

CHATHAM, N.B., October 31, 1900.

SIR,—I have the honour to submit my report for the year ending October 31, 1900.

No disease of a contagious or infectious character was found on any of the vessels inspected at this port during the past season.

The number of vessels inspected since the commencement of the quarantine year was 102.

One steamship, the *Saint Giles*, arrived on October 3, sixteen days out from Glasgow. A thorough inspection of all on board revealed no sign of the terrible plague which at the time of sailing prevailed in the above-mentioned city, and the ship was admitted to pratique without detention.

The boat used in boarding ships is old and unsafe for boarding in rough weather. I most respectfully recommend that a new one be procured for next season.

The quarantine buildings have received a much-needed coat of paint. The work was done by the careful and efficient caretaker, Mr. I. Currie. It was necessary to procure two ladders which were required in painting the buildings, and are absolutely necessary in case of fire breaking out about the premises.

Your instructions *re* Danysz Bouillon were promptly carried out, and the material distributed about the wharfs and warehouses of Chatham.

I have the honour to be, sir,
Your obedient servant,

J. MACDONALD,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 7.

QUARANTINE OFFICE,
CHARLOTTETOWN, P.E.I., October 31, 1900.

SIR,—I have the honour to submit my report for the year ending October 31, 1900.

No grave disease of a contagious character was found to exist on board any vessel arriving at this port during the past year.

The trade in vessels to this port is chiefly from points north of New York.

There were eleven arrivals from transatlantic ports and the West Indies, all of which were duly inspected.

The repairs to the hospital building, which were sanctioned by the Director General of Public Health last year, still remain unattended to.

I have the honour to be, sir,
Your obedient servant,

P. CONROY, M.D.,

The Honourable
The Minister of Agriculture,
Ottawa.

No. 8.

VICTORIA, B.C., October 31, 1900.

SIR,—I have the honour to submit this my report for the year ending October 31, 1900. The past year has been the busiest in the history of William Head station.

This has been due particularly to the presence of plague in ports from which 80 per cent of the vessels coming to British Columbia sail. This disease has been present again in Hong Kong, and has broken out during the past year for the first time in different places in Japan, although there, fortunately, making little headway; in Manila, Sydney, Brisbane and other points in Australia, and nearer at hand in Honolulu and San Francisco. The outbreak in Honolulu, which occurred in December and lasted until March, necessitated the fumigation by sulphur for the destruction of the rats on all vessels which had been at the docks in Honolulu. Some thirteen vessels were so treated. The crews were bathed, and their effects disinfected by steam. These vessels were all sailing ships or tramp steamers.

Before plague had subsided in Honolulu it appeared in Chinatown, in San Francisco, where it still continues, although only a score of cases have been discovered, one every week or so. There is reason, however, to believe that other cases have occurred, but with the peculiar secretiveness of the Chinese, these have been concealed. On the occurrence of the first cases of plague in San Francisco the exemption from medical inspection of vessels from that port was withdrawn. Having to examine vessels from San Francisco has made the number of vessels now examined nearly double than formerly examined.

During May the exemption from inspection of vessels from Puget Sound was on account of the prevalence of small-pox in the neighbouring states also withdrawn, and medical inspection at railway points on British Columbia boundary line was also instituted. A few weeks afterwards small-pox made its appearance in Alaska and Yukon Territory, and vessels carrying passengers from there were also required to undergo inspection, this work has been done by Dr. Fraser, of Victoria, and Dr. McKechnie, of Vancouver. The disease was carried north by vessels leaving Seattle. From there the disease returned on south-bound steamers, being found on three vessels arriving at Puget Sound, and within the last week on the *City of Seattle,* arriving in Vancouver. A case of small-pox was discovered on her by Dr. McKechnie, quarantine officer at that port, as the passengers filed by him. At the time of writing, passengers and crew of this vessels are in quarantine at William Head. Incidentally I might say that the duties of attendance upon the large number of people now here prevent my compiling as full a report as the work of the past year would properly call for. Vessels which were quarantined during the year on account of small-pox are the *Monmouthshire*, with Chinese and Japanese steerage passengers, and the *Walla Walla,* from San Francisco, with some 250 persons, comprising passengers and crew, all Europeans, and the *City of Seattle*, from Skagway, with some 350 passengers and crew, mostly returning miners. These vessels had all for their final destination some United States port, and the majority of passengers in every instance were for United States. At the request of the steamship companies, and by wish of the American-bound passengers, they were allowed to pass their period of detention at this station. The owners were thus able to secure release of the vessel, and the passengers necessarily putting up with certain inconveniences here because of the accommodation for saloon passengers only being sufficient for the care of the largest numbers of Canadian-bound passengers likely to be detained, were content to avail themselves of the large dormitories erected for steerage accommodation. Some passengers, however, went into tents by preference. The women and children were given good and sufficient accommodation in the saloon building.

A number of Indians who had been at the hop fields in Washington state were detained under observation, some at William Head and others at different points in the province, as small-pox had occurred amongst the Indian hop-pickers.

A case of small-pox occurred on the *Empress of India* while in Shanghai, nineteen days before arrival here. As proper precautions had been taken there, and all were well on arrival, no detention was enforced. One of the saloon passengers of the *Empress of Japan* was taken ill on the overland train, and died in Winnipeg about ten days after leaving here. The cause of death was not recognized as small-pox until suspicion was aroused by the nurse in attendance and others coming down with the disease a fortnight afterwards. The origin of infection in the case of this passenger is surrounded in mystery, but the infection might have been acquired in Japan before departure. The ss. *Tees*, from Skagway, spent 24 hours in quarantine as a case of illness, suspected to be small-pox, was reported on arrival in Victoria; this suspicion, however, turned out incorrect.

On account of the prevalence of plague, a bacteriological laboratory was established during the spring, Chas. H. Higgins, assistant pathologist of the Department of Agriculture, being sent out from Montreal to establish it. The Haffkein prophylactic fluid is being manufactured here. Professor Adami, of McGill University, pathologist of the Department of Agriculture, inspected the laboratory while on a visit to the coast, and considered it thoroughly equipped. When a new building is erected for the laboratory, it will be possible to arrange the apparatus more conveniently.

During the summer considerable repairs to the wharf were made, the work done being for the purpose of bracing the wharf more thoroughly. A number of the buildings at the station were painted, and preparations were made to paint others, but the arrival of small-pox at the station deferred the work.

The ss. *Earl* has not always been available for service, on account of the condition of the boiler, but when the new boiler which has been authorized is put in, she should give satisfactory service, although the weather here is often too rough for a boat of the *Earl's* size and design.

A new steam disinfecting chamber has also been authorized, but the tenders have not yet been called for.

The routine disinfection of steerage passengers from China and Japan has been carried out as in the previous three years. A feature of last season's immigration was the exceptionally large numbers of Japanese who came over. One vessel brought as many as 1,600. The bathing of this number, and the disinfecting of their clothing and baggage, occupied the staff for thirty-six hours at a stretch. Fortunately, the amount of baggage brought by these people is small, or a much longer time would have been occupied. Some twenty-three thousand Chinese and Japanese steerage passengers, and numbers of crews, have been bathed and had their effects disinfected during the past twelve months, nearly two-thirds of this number being Japanese. This is much in excess of last year, when only some ten thousand were so treated.

Arrangements are being made by the American sanitary officials in Hong Kong and Japan for thoroughly disinfecting steerage passengers and effects before departure, and for enforcing, when it seems desirable on account of prevalence of plague, an ante-embarkation detention period of fifteen days. All Japanese passengers are thus now treated, whether bound for Canada or the United States, the various steamship companies having agreed to take the precaution. The Canadian Pacific Railway steamers, however, owing to the prevalence of plague in Japan, have latterly entirely discontinued carrying Japanese passengers.

Chinese passengers on all American-bound vessels are also disinfected in Hong Kong. This is carried out for both American and Canadian passengers.

The number of vessels inspected has been three hundred and sixty.

The diseases treated in the hospital have been small-pox, dysentery, beri-beri and diarrhœa. Two deaths have occurred, one from small-pox, one from diarrhœa.

The station has been visited during the past year by Dr. Montizambert, D.G.P.H., by Dr. Kenyon, of Angel Island Quarantine, California S.M.H.S., by Dr. Foster, P.A.S.M.H.S., quarantine officer at Port Townsend, and by Dr. Fagan, sec. P.B. of H., of British Columbia. These gentlemen expressed themselves pleased with the equipment here.

I have the honour to be, sir,

Your obedient servant,

A. T. WATT, M.D.,

Superintendent British Columbia Quarantine.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 9.

REPORT ON VICTORIA, B.C., QUARANTINE STATION.

(R. L. Fraser, M.D.)

VICTORIA, B.C., November 1, 1900.

SIR,—I herewith submit my report for the Quarantine Station, Victoria, B.C., for the year just ended.

No case of contagious or quarantinable disease arrived here during the year. This is very fortunate, for small-pox has been prevalent to the north and south of us during most of the year.

On May 3, I received instructions from Dr. Montizambert, Director General of Public Health, to inspect all foreign vessels touching here. For nearly two months prior to this date these boats were inspected by the Provincial Board of Health. There are four daily boats from Puget Sound ports, and from two to five weekly boats from Alaska. Many of these steamers arrive here at night, when a satisfactory inspection is difficult to make.

I would respectfully suggest that when vessels are subject to inspection it should be done in daylight.

I have the honour to be, sir,
Your obedient servant,
R. L. FRASER, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 10.

REPORT ON VANCOUVER, B.C., QUARANTINE STATION.

(L. N. MacKechnie, M.D.)

VANCOUVER, B.C., October 31, 1900.

SIR,—I have the honour to submit this my report for the year just ended.

The number of vessels inspected was 223. Only one case of contagious or infectious or quarantinable disease arrived at this port during the year. It was one of small-pox, from Ketchikan, on the ss. *City of Seattle*, which went into quarantine at William's Head October 22. Since May 1, all vessels arriving from Alaska and ports north of San Francisco have been inspected.

Some vessels arriving from Alaska call regularly at Port Simpson and other British Columbia ports. Other vessels call at Oyster Harbour and Union to coal; all of these are properly coastwise vessels, but they also have been inspected.

I have the honour to be, sir,
Your obedient servant,
L. N. MACKECHNIE, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 11.

REPORT ON THE LAZARETTO, TRACADIE, N.B.

(A. C. Smith, M.D.)

TRACADIE, N.B., October 31, 1900.

SIR,—I have the honour to submit this my annual report on the leper hospital at Tracadie, N.B., for the twelve months ending at this date.

There are to-day twenty inmates of the lazaretto, thirteen males and seven females. The ages of these patients, with dates of admission, are respectively as follows:—Nineteen (admitted November, 1899), twenty (March, 1899), twenty-two (April, 1897), twenty-three (November, 1899), thirty (April, 1897), thirty-one (December, 1897), thirty-three (April, 1897), thirty-five (October, 1900), thirty-six (April, 1897), thirty-six (July, 1897), thirty-seven (July, 1878), thirty-seven (August, 1890), forty (October, 1897), fifty-three (October, 1896), fifty-four (April, 1897), fifty-six (July, 1896), fifty-six (October, 1880), fifty-nine (June, 1899,) sixty-one (December, 1897), sixty-four (November, 1897).

Seven of the inmates may be classified as being in the *first*, twelve in the *second*, and one in the *third*, the final, stage of the malady.

There were four deaths during the year, and three new cases were admitted from the surrounding districts. All known cases are now promptly segregated. Formerly when segregation was far from thorough, the disease spread rapidly.

During the months of January and February there was an unusual amount of illness among the inmates. The improved sanitary conditions, and the system of uniform heating at the lazaretto, were valuable aids to the medical treatment of the sick.

The general behaviour has been most satisfactory, and the unfortunate sufferers seem contented and at times surprisingly cheerful. During fine weather many of them spend a large portion of their time outdoors, but no efforts at escape are ever made. The inmates of the lazaretto, although isolated from the world, enjoy all the comforts obtainable, and it is impossible not to observe the kindness and attention shown by the sisters in charge to these afflicted people under their distressing circumstances.

During the year I have received favourable reports on the use of chaulmoogra oil and creolin, in foreign leper hospitals. Several of our less advanced cases have been induced to make a trial of these drugs, and with encouraging results.

As in former years, I have been called on to examine several persons, male and female, unjustly reported leprous, and to give the necessary certificates, thus enabling them to resume employment.

The citizens of the neighbouring republic are awakening to the necessity of a national leper asylum. 'Investigation, which has hitherto moved in a more or less academic orbit, commandeered by pamphleteers, has entered into a definitely practical phase.' This is a matter of interest to the people of Canada.

I have the hour to be, sir,
Your obedient servant,
A. C. SMITH,
Inspecting Physician in Leprosy and Physician to the Tracadie Lazaretto.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 12.

REPORT OF ASSISTANT PATHOLOGIST.

(Chas. H. Higgins, B.S., D.V.S.)

SIR,—I have the honour to transmit this my report as assistant pathologist to the Department of Agriculture, covering the work in connection with the 'bio-chemic' laboratory of the William Head Quarantine Station, from March 28 to October 31, 1900.

Upon receiving my instructions on March 23, I concluded, as far as possible, the work then on hand at the Outremont Experiment Station, leaving for this point upon the 28th, arriving in Victoria on April 2, and at this quarantine station on April 3.

Before leaving Montreal such apparatus as was deemed necessary was ordered through your office, part of which reached me the latter part of April. The remainder followed shortly after.

With the advice and consent of Dr. A. T. Watt, superintendent of British Columbia quarantines, the north wing of the 'Japanese' building was selected for the laboratory till such time when a suitable building could be provided.

After the installation of the apparatus my first work was to familiarize myself with the 'Bacillus Pestis Bubonica,' in order that I might be fully prepared to give a correct diagnosis should a suspected case of bubonic plague reach this station. This work I have found very interesting and instructive, as the germ is so different in its characteristics from any hitherto studied.

DESCRIPTION OF THE PLAGUE BACILLUS.

Morphology.—*Short, thick, straight rods, with rounded ends.

In length it varies from 0:7-1:2 m., and is half as broad They sometimes occur in chains, and have been observed in some cases to have a capsule. In fresh broth cultures they are often seen in chains, resembling streptococci. In old cultures they sometimes completely lose their elongated shape and appear as cocci. The germ takes the polar staining, leaving an unstained central portion. In unstained preparations and in the hanging drop this polar arrangement of the protoplasm is noticed. The form of the bacillus varies greatly according to the media upon which it is grown and also upon its age.

CULTURAL CHARACTERISTICS.

Broth.†—It is upon broth that we get the characteristic growth of the plague germ. Rarely is anything seen on the first day, even with the most virulent culture, but upon the second and third days, provided the flasks containing the inoculated broth are upon a solid bench and free from jarring, there are to be seen stalactite growths in the form of very fine needles. These stalactite growths upon the least jarring of the flask break away from the fat to which they are suspended, sinking to the bottom.

Various preparations of broth have been tried, but the one found best suited to the work is that given in the formula referred to. This germ does not thrive well upon broth to which has been added glycerine, glucose or lactose. The reaction of the

*The germ described was furnished by Dr. Wyman, of Washington, upon request through your office.

†For the method of preparation see description given in connection with the manufacture of Haffkine's Prophylactic.

media is also a very important point, as a slight amount of acid or alkali will retard or completely destroy its growth. At this laboratory the best growths have been obtained upon media neutral to phenolpthalein, this media giving the strongest Haffkine's in the shortest time.

Gelatin.—Upon gelatin there is nothing characteristic; the growth appearing after the fifth or sixth day as fine granular masses along the entire stab.

Agar.—Upon agar we get a characteristic look to plague cultures, the growth appearing as very pale masses upon the surface after the second day, having a shining, slimy look. These masses upon being teased with a platinum wire, draw out into long sticky threads, and are easily moved about upon the surface of the agar. With a culture that has been grown in the laboratory for some time, even if fresh cultures are made upon the dry surface of agar tubes, we get numerous involution forms, which appear in the stained preparation as brownish masses swollen to such a size as to have completely lost their original shape. Upon agar plates there is little difference in the appearance of the germ from that seen in tubes of the same material.

Blood Serum.—Very slight growths only have been obtained upon the blood serum at hand, as it contained 7 per cent glycerine, being originally put up for the growth of tubercle, and not at all suited to plague work.

INOCULATION DISEASE.

The inoculation disease has been observed only in guinea pigs, they having been the most easily acquired animals.

Symptoms.—A guinea pig inoculated subcutaneously shows at the end of twenty-four hours marked depression, rise in temperature and enlargement of the lymph glands, particularly those of the inguinal region. He refuses food and water, sitting in a corner of the cage motionless, unless forced to move. The respirations are increased, the temperature rises from normal to 104-106° Far., and remains at this point till death supervenes.

Pathological Lesions.—The lesions of plague as seen in the guinea pig are characteristic. We have first the enlargement of all of the external lymph glands. Those of the inguinal region are greatly enlarged and inflamed, much more so than glands in other portions of the body, which is probably due to the fact that they are nearer the point of inoculation. True suppuration has not been observed in any cases. Upon opening the abdominal cavity the spleen is seen to be greatly enlarged, and contains numerous necrosed, tubercular-like masses about the size of a pin head. The liver is enlarged and congested. The gall bladder is greatly distended with bile. The kidneys present little to the naked eye. The lungs at times are affected, and contain small inflamed masses about the size of a small pea. The bacillus pestis is found in all of the tissues and fluids of the body.

Upon microscopical examination we get a cloudy swelling of the spleen, liver, kidneys and other organs. We may have in the lungs, spleen and liver secondary areas of necrosis. The bacilli are found irregularly in the tissues in enormous numbers.

VIRULENCE OF PLAGUE BACILLUS.

This varies greatly according to the media upon which it is grown, and upon the conditions under which it is kept. The weakest germ worked with killed a guinea pig in seven days. The most virulent in fifty-seven hours.

Grown upon ordinary culture media it soon loses its virulence. It has been found that by using capillary tubes much greater success has been obtained, and it has been possible, under favourable conditions, to retain its virulence for a period of three months. How much longer than this it would be possible to keep such culture has not been determined.

HAFFKINE'S PROPHYLACTIC.

Work in connection with this product has been the main feature in connection with the laboratory since its origin. The manufacture of this preparation, while it is very simple, requires great care in preparing the media and in its subsequent treatment. The medium used was beef broth, made in the following manner :—

Liebig's extract of beef	5	grams
Witte's peptone	10	"
Sodium chloride C.P.	5	"
Water	1000	"

After thoroughly boiling, this is neutralized to phenolpthalein, filtered and placed in flasks of suitable size for its manufacture. To each of the flasks sufficient butter fat* is added to allow a thin film over the surface, after which they are sterilized and are ready for inoculation. This inoculation was practised immediately from the affected organ or from a virulent culture; the best results being obtained when the virus was taken direct from the infected organ. These inoculated flasks are placed in an incubator and allowed to remain for a period of three to six weeks as the case may require. They are examined at least every four days, and the crop of germs clinging to the under surface of the fat are shaken down in order that another crop may form. When it is seen that the successive crops are growing smaller and smaller, the flasks are removed from the incubator and held for an hour at 70° C., which kills all of the living germs. While still hot it is drawn off into sterilized bottles, 10 c.c. being placed in each. These bottles are then sealed with a sterilized rubber stopper and immersed in hot parafine to the neck, forming a thin film over the rubber stopper, hermetically sealing it. Great care is essential in this process of bottling, as there is great liability to contamination.

After the fluid has been bottled, a number of these bottles are tested to determine the strength of the toxine, and the amount required to immunize a guinea pig determines the proportionate amount required for man. The method of standardizing is, to say the least, a very crude procedure, and attempts have been made to determine the strength of the toxine by chemical methods, but in this laboratory no success has been obtained by any of the methods tried. Such a method would be better than the one at present practised.

A number of bottles from each flask are also placed in the incubator, where they are allowed to remain for a period of two weeks in order to determine whether there has been a contamination of the product during the bottling, from imperfect sterilizing or accidents.

SYMPTOMS OF HAFFKINE INOCULATION IN GUINEA PIGS.

The symptoms of the Haffkine inoculation in the guinea pig are much the same during the first few days as those of plague, after which the animal gradually recovers, becoming by the process an 'immune,' and will resist infection by contact and by subcutaneous inoculation of virulent cultures. If an exceedingly large amount of virulent culture is injected into an immune guinea pig he succumbs, which is due to the fact that he is unable to withstand the shock and the poisonous effect of the toxine injected with the living bacilli. Under ordinary circumstances he is an 'immune,' and will remain so for a period of three months.

SYMPTOMS OF HAFFKINE INOCULATION IN MAN.

In connection with this inoculation I can only relate my own experiences in this connection, as the conditions existing have not seemed to warrant the inoculation of any of the quarantine staff, nor have any specially desired such inoculation.

*The butter fat used in connection with my media was prepared by heating a small amount of butter in an autoclave, together with a large amount of water. This was repeated several times, and the stock preparation was kept sterile in a flask to be used as desired.

A few hours after the inoculation there is a feeling of restlessness, slight rise in temperature, glassy look to the eyes, pains in the arms and legs of a mild character. This feeling of restlessness continues, being accompanied by weakness. There is a desire to be moving all the time, but the feeling of exhaustion will not allow such movements. After ten hours the symptoms gradually decrease, and no untoward effects experienced save the swelling and soreness at the point of inoculation. This soreness at the point of inoculation lasted for about ten days, leaving a nodule, which disappeared in two months. The lymphatic glands were slightly enlarged in about eight hours, and remained so for three days.

This vaccination against plague was not as severe in this case as ordinarily follows small-pox vaccination.

Aside from the work upon plague, I have done some experimenting upon beri beri, and examined preparations taken from small-pox patients, but am unable to add anything to what is already known about these diseases.

ACETYLENE GAS FOR LABORATORY USES.

In connection with the report upon the work of this laboratory, I wish to speak of the gas machine in use here. Being situated away from a city gas supply, and not desiring to work with coal oil and gasolene, I installed an acetylene gas machine for all of the uses of this laboratory.

The machine selected was a 'Burnonville,' manufactured by The General Acetylene Company, of New York City. This machine, in mechanical construction, seemed to be best adapted to my uses, at the same time requiring but very little attention. In order to render it possible to use acetylene Bunsen burners, it was necessary to modify the machine in order that a pressure on the gas main sufficient to raise a column of water four inches could be maintained. This was accomplished by modifying the traps. Without this pressure it is impossible to run these burners. The gas main used for lighting and running the incubators had a pressure sufficient to raise a column of water an inch and a half.

This machine has more than fulfilled my expectations, and personally I prefer this gas for general laboratory uses to the ordinary coal gas. With it you are always sure of your pressure, you are independent in your supply and can always have sufficient gas for any purpose. The acetylene light makes the best light I have ever used for microscopical work, giving a clearer definition and bringing out the colours more distinctly. In spite of the high explosive nature of a mixture of this gas with air, I have experienced no trouble, nor do I consider it dangerous to use provided one uses a fair amount of common sense at all times in its manipulation.

I have the honour to be, sir,
Your obedient servant,

CHAS. H. HIGGINS, B.S., D.V.S.,
Assistant Pathologist, Department of Agriculture.

The Honourable
The Minister of Agriculture,
Ottawa.

CATTLE QUARANTINE.

No. 13.

REPORT ON THE CATTLE QUARANTINES IN CANADA, FROM NOVEMBER 1, 1899, TO OCTOBER 31, 1900.

(By Professor Duncan McEachran, F.R.C.V.S., V.S. Edin., D.V.S. McGill, Chief Inspector of Live Stock for Canada.)

Office of the Chief Inspector of Stock,
Montreal, October 31, 1900.

Sir,—I beg to transmit herewith my twenty-fourth annual report on the cattle quarantines of the Dominion.

I have much pleasure in calling your attention to the excellent health and condition of all classes of live stock throughout the entire Dominion. Hog cholera, which, a few years ago, was widespread, especially in the western peninsula of Ontario, has been entirely eradicated from the most infected centres, and may be said to scarcely exist.

Glanders still continues to occur in the North-west Territories and Manitoba, attributed largely to importations of cheap horses from the south. It is at present not known to exist in the older provinces.

Scab in sheep is at present confined to a few farms in the townships of Eldon, Brock and Thorah, in western Ontario, which are under quarantine.

Mange in cattle, which was epizootic in Alberta and part of Assiniboia, North-west Territories, is well under control, and it is confidently believed that by a continuance of the measures adopted for another year it will altogether disappear.

Tuberculosis is rapidly decreasing throughout the Dominion, as will be seen by the fact that out of 17,785 head tested, by request of the owners, only 358 reacted.

I regret to say that this disease has again been discovered in imported cattle. In one case, in a herd which was not tested in quarantine, but at the owner's farm ; in another, in a herd, not tested in quarantine, but tested when entering the United States; also in two herds tested in quarantine by order of the owners.

I have the honour to be, sir,
Your obedient servant,

D. McEACHRAN,
Chief Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

IMPORTATIONS, MARITIME CATTLE QUARANTINES.

—	Cattle.	Horses.	Sheep.	Swine.	Mules.
Lévis Cattle Quarantine, Quebec	508	2	1,063	15	....
St. John, New Brunswick	117	19	36	9	....
Halifax, Nova Scotia	....	....	....	....	....
Charlottetown, P.E.I.	....	1	....	....	....
Montreal	....	196	....	....	....
	625	218	1,099	24	

Of these 83 cattle, 190 sheep, and 2 swine were for the United States.

IMPORTATIONS FROM THE UNITED STATES AT FOLLOWING PORTS.

—	Horses.	Cattle.	Sheep.	Swine.	Mules.
St. John, New Brunswick	....	2	1	....	....
Niagara, Ontario	1	4	1	32	....
Point Edward, Ontario	....	28	....	18	....
Windsor, Ontario	9	45	1	7	....
Emerson, Manitoba	881	82	297	23	14
Gretna, Manitoba	1,077	304	160	156	61
North Portal, Assiniboia	2,627	1,260	73	355	71
Maple Creek, Assiniboia	1,110	7	....	....	....
Lethbridge and Coutts, Alberta	279	34	....	....	....
Macleod, Alberta	106	94	2	....	....
Nelson, B.C.	94	44	6,543	5	....
Rossland and Trail, B.C.	26	1	....	143	2
Grand Forks, B.C.	150	54	316	197	....
Victoria, B.C.	61	4	155	30	....
	6,421	1,963	7,549	966	148

It will thus be observed that, as compared with the preceding year, there has been an increase in importations of European pure-bred stock of 377 cattle, 342 sheep, 15 swine, and 190 horses.

At the Point Lévis cattle quarantine there were sixteen calves born, and two calves, one cow and two sheep died there.

On an understanding with the Bureau of Animal Industry, and by request of the owners, thirty-one head of cattle, intended for the United States, were tested in quarantine; twelve of them re-acted, and are, at the desire of the owner, still in quarantine. The calves born there will be removed and fed by tested foster mothers (Bang's system), and may thus be saved.

Of another herd which was not tested in quarantine, two re-acted when tested on entering the United States and were prohibited entry.

These and similar cases, together with Dr. Salmon's statement, that 'it is alleged that parties who are to bring cattle into the United States intend to avoid our quarantine and bring them by way of Canada, so that the animals will not be necessarily tested after their landing in America,' and that 'if the importers are afraid to have their cattle tested in the quarantine station, that is an evidence that they have no confidence in their being free from disease,' have, unfortunately for Canadian breeders of pure-bred stock, led to the following regulations being substituted for previously existing ones, by which charts of testing by any veterinarian authorized to test by the Minister of Agriculture were accepted at United States ports of entry :—

(B. A. I. Order No. 79.)

REGULATIONS FOR THE INSPECTION AND QUARANTINE OF HORSES, CATTLE, SHEEP AND OTHER RUMINANTS, AND SWINE IMPORTED INTO THE UNITED STATES.

(Amendment to B. A. I. Order No. 56.)

U. S. Department of Agriculture,
Office of the Secretary,
Washington, D.C., November 10, 1900.

It is hereby ordered, That rule 5 of the regulations for the inspection and quarantine of horses, cattle, sheep and other ruminants, and swine, issued under date of December 28, 1899, B. A. I. Order No. 56, be and is hereby amended to read as follows : All cattle over six months old imported into the United States after December 1, 1900, which are subject to quarantine, and except as otherwise provided, shall be tested with tuberculin by an inspector of this department, stationed in Great Britain, or after arrival at the animal quarantine station. All cattle so tested and which show a reaction shall be prohibited from entry into the United States or be disposed of as provided in section 10 of above regulations.

For cattle imported by way of Canada, certificate of tuberculin tests made by the Canadian superintendent of quarantine during the period of detention will be accepted.

It is further ordered, That rule 6 (paragraph *c*) be and is hereby amended as follows : All milch cows, and cattle over six months old, for breeding purposes, shall be tested with tuberculin by an inspector of this department, and all cattle so tested which show a reaction shall be prohibited from entry into the United States.

JAMES WILSON,
Secretary.

Those desiring animals tested abroad should address Dr. Tooie A. Geddes, care of U. S. Consul General's Office, London. Those desiring cattle tested in Canada should address Dr. E. L. Volgenau, Live Stock Exchange Building, East Buffalo, N.Y.

Permits as required by rule 9 of B. A. I. Order No. 56 for cattle and other animals must be obtained as heretofore.

It is to be hoped, however, that the matter may be reconsidered and some understanding adopted whereby Canadian charts of tests will be accepted even if they are to be granted only by a few specially qualified men in whom implicit confidence can be placed.

EXPORTATION FROM MANITOBA AND THE NORTH-WEST TERRITORIES.

In compliance with a request, I have been furnished by the general freight traffic manager of the Canadian Pacific Railway with the following statement of cattle carried by them from Manitoba and the Territories to Montreal for shipment, for twelve months ending October 31, 1900:—

	Cattle.	Sheep.	Horses.	Swine.
Manitoba..	5,490	300	....	....
North-west..........	43,863	1,379	50	....

This is an increase of 18,695 cattle, 1,486 sheep, 25 horses, with a decrease of six swine.

It does not include the army horses for South Africa.

EXPORTATION OF LIVE STOCK FROM MARITIME PORTS.

Table showing numbers shipped during past five years.

—	Cattle.	Sheep.	Horses.	Swine.	Dogs.
1896	101,502	117,428	11,531	....	....
1897	117,428	62,406	10,651	....	....
1898	111,948	47,050	7,057	....	....
1899	97,014	62,308	4,980	174	....
1900	103,511	7,734	3,597	63	2

The horses from South Africa were not inspected by your inspectors, and are not included in the above statement.

SHIPMENTS FROM EACH PORT.

—		Cattle.	Horses.	Sheep.	Swine.	Dogs.
Montreal		87,287	2,997	2,483	....	....
St. John		15,471	485	2,911	....	....
Charlottetown	United States	....	....	240	....	....
	West Indies	5	24	22	....	....
	Newfoundland	703	56	2,249	63	....
Halifax	Great Britain	....	6	....	....	2
	Jamaica	3	5	62	....	....
	Bermudas	23	18	74	....	....
	West Indies	77	4	91	....	....
	Newfoundland	12	2	2	....	....
Total		103,511	3,597	7,734	63	2

Table showing number from United States in above:—

	Number.
Cattle	9,083
Horses	72
Sheep	2,398

It will thus be seen that there is an increase of 6,497 cattle, and a decrease of 1,383 horses, 54,574 sheep and 111 swine as compared with last year.

The number of animals rejected by your officers as being unfit for shipment is gratifyingly small : 106 cattle, of which nine were rejected for actinomysis, the balance from injuries in transit, most of them in a railroad collision. Owing to the action of the Montreal civic authorities in condemning all cases of actinomycosis, the number brought to this port during the shipping season is greatly reduced. Thirty-one sheep were rejected for lameness, and forty-seven horses were rejected, forty-three for influenza and four for strangles.

It is gratifying to know that the results of using better bred bulls are becoming apparent in the improvement of the cattle exported ; this is particularly noticeable in those from the western herds. Now the breeders have started on proper lines of breeding, the improvement will become more and more marked as the years go by.

The placing of Ontario-bred shorthorns on the Alberta ranges still continues actively ; large numbers of Ontario and Manitoba stockers have also been placed on the ranges during the past season.

The cattle trade of the country, on the whole, may be said to be prosperous, and breeders and feeders are following greatly improved methods in their business.

By reference to the reports of the inspectors from all parts of the Dominion, it will be seen that the health of live stock is all that could be desired or expected; no other cattle-raising country in the world can show such a clean bill of health or such freedom from contagious, or even ordinary, diseases of animals. The climate, soil, food and water throughout the Dominion are such that all farm animals with ordinary care do well.

I have much pleasure in reporting that the duties of inspection were satisfactorily performed at the maritime ports, at Montreal by Doctors Baker, D.V.S., C. McEachran, D.V.S., and B. A. Sugden, D.V.S.; at Quebec by Dr. J. A. Couture, D.V.S.; at St. John by Dr. Frink, V.S.; at Halifax by Dr. William Jakeman, D.V.S; at Charlottetown, P.E.I., by Dr. A. A. Leckie, M.R.C.V.S. Reports from these gentlemen you have already received.

TUBERCULOSIS.

STATEMENT showing number of cattle tested in each province during twelve months ending October 31:—

Province.	Number Tested.	Number Reacted.
Ontario	13,089	200
Quebec	1,210	27
New Brunswick	1,439	29
Nova Scotia	275	10
Prince Edward Island	343	4
Manitoba	1,198	77
North-west Territories	15	....
British Columbia	216	11
Total	17,785	358

Bearing in mind that the testing is voluntary on the part of the owners, and that most of the herds tested are suspected, the remarkably low percentage of re-actions indicates that this veritable plague exists to only a limited extent. And considering that a large proportion of these animals which react would, if fattened and slaughtered, be found, on examination, to be quite fit for food, the total loss would be very small even if all were killed off, and would be insignificant compared with the benefits which would ensue to our live stock industry and public health.

It is by no means necessary, however, to kill off immediately all racting animals; as a matter of fact, in the case of valuable, highly-bred stock, it would be an unnecessary waste to do so.

BANG'S SYSTEM OF BREEDING FROM TUBERCULOUS STOCK.

Having recently paid a visit to Denmark,* during which I had the privilege of spending a few days with Professor Bang, and acquiring a full insight into his methods of dealing with this disease, I longed for a favourable opportunity of putting my information to a practical test in Canada.

This opportunity occurred within a few months of my return home. It appeared that Mr. W. C. Edwards, M.P., of Rockland, Ontario, who was the possessor of one of the largest and most valuable shorthorn herds in Canada, had consulted you with reference to the discovery by him of tuberculosis in his herd. Having sold a bull calf for export to the United States, the United States regulations necessitated that it should be tested before being admitted to that country. This was done and the test showed that it was diseased. Mr. Edwards decided on having his whole herd tested, with the result that 36 cows and heifers reacted, a very large number of high-priced shorthorns which he looked upon as sacrificed, entailing not only a considerable money loss but the derangement of his whole breeding operations.

At your request I visited Mr. Edwards' farm to advise him what was best to do under the circumstances.

Happily I found Mr. Edwards very willing to carry out my suggestion, and with commendable public spirit willingly accepted my advice to give Bang's system a fair trial, thus at his sole expense giving a valuable object lesson to all breeders of pure bred stock in the Dominion, as to what is possible in dealing with tuberculosis in valuable herds.

On returning to Montreal I addressed the following communication to Mr. Edwards the suggestions in which he at once assured me would be carried out to the letter. This was done, Dr. Higginson, V.S., who was appointed to carry out the details, coming to Montreal to be instructed in the details of testing, &c.

'MONTREAL, June 29, 1898.

'DEAR SIR,—I would suggest that in dealing with your cattle with a view to carrying out Professor Bang's system, by far the best plan is to remove every reacting animal, young and old, to an isolated farm which will be all the better if several miles away from your main farm buildings.

'As none of them at present show any clinical symptoms they can be bred from and their calves if removed as soon as born and nursed by tested cows in a building, say the home farm buildings, which have been thoroughly disinfected, or better still in a new building, which you propose to erect in rear of the main byres, the greatest care being exercised in preventing the cow licking her calf, or its sucking the mother. These calves are to be tested with tuberculin when six weeks old, and any reacting must be killed. They will be tested every six months, thus making sure that no tuberculous ones remain amongst them.

'By this means you can preserve the improved blood and raise a healthy herd from the diseased cows. These cows should be kept in the best of hygienic surroundings—and kept out of doors as much as possible—any of them developing clinical symptoms should be destroyed. I would suggest as an experiment that a few common calves from healthy cows (both cow and calf having been tested) be put on to suckle the diseased cows and cohabit with them to prove the communicability of the disease by this means and a few similar calves be kept in a non-infected building perfectly isolated and fed on milk drawn from the diseased cows, both sets of calves being tested every three months : any reacting being killed and a careful post mortem examination being made.

* See report of visit to Europe, 1897-98.

'The breeding of the non-reacting portion of the herd can thus go on with every confidence, the testing being repeated every three months, and any reacting cattle removed to the diseased herd. The byre should be disinfected on every occasion a reaction takes place. By this means as I explained to you your business of breeding and selling can go on undisturbed ; the diseased ones having been removed and being miles away from your healthy herd.

'I have considered your proposition to divide the large home byre by a close board partition into two (1 and 2) to keep the healthy animals in No. 1 and the diseased animals in No. 2. While it would be quite possible to carry out Bang's system by this means, I would strongly urge the advantages of removing them to a separate farm as above indicated. Buyers would certainly have more confidence in the freedom from disease if there was absolutely no disease on the premises or diseased cattle on the farm.

'Should the diseased cattle have more milk than can be used by the experiment calves, it may be made use of for feeding purposes for calves or pigs without risk of infection if it is raised to 180° F.

'This temperature will kill the bacteria, without giving a taste to the milk or interfering with its usefulness for butter and cheese making, such as occurs when it is boiled. This sterilization will require special apparatus and experienced management.

'In the event of your deciding to kill any of the reacting cattle—on making a post mortem examination if the disease is found to be limited and local—the flesh is considered fit for food, but it should be thoroughly cooked before being eaten ; if it is general in the cavities of the belly and chest the flesh should be condemned.

'There are four conditions that are known to be specially infective and animals showing clinical symptoms of these conditions should not be kept in the herd on any account, but should be destroyed and no use made of them :

'*a*, When the lungs are specially affected; *b*, when the udder is diseased; *c*, when there is diarrhœa, indicating disease of the intestines; *d*, when there is tuberculosis of the uterus. No cattle should be brought into the herd without being tested and found free from disease. Disinfection cannot be too thoroughly done. Every board, joint, corner or crack or crevice should be thoroughly exposed to steam which you can easily arrange ; then with a spraying pump, a solution of commercial carbolic acid, a pint to two gallons of water, should be thoroughly sprayed on to the divisions, floors, feed-boxes, walls and ceilings, and the loose boxes whitewashed to a height of eight feet from the floor.

'VENTILATION.

'I would suggest that the ventilating shafts be enlarged and divided as I explained to you verbally and as indicated by the following rough diagram, the division boards coming only to within three or four feet from the ceiling—with a regulating shutter. It may be divided into two or four shafts, if four, they should be placed at the points of the compass. I will see that Mr. Higginson is well instructed in all the details of testing and carrying out the suggestions made above—and in recording regularly symptoms, temperature and reactions, also observations as to the effect of exposure to infecting media. I may say that being a firm believer in Bang, I feel satisfied that you can rid your valuable herd entirely of the disease with but little sacrifice, owing to their being useful for breeding from ; a position once attained with a herd of such excellence in individual merits and breeding, will enable you to command a market in the United States or Canada far beyond your ability to supply, while others who are indifferent about it will find it difficult to sell animals which cannot be guaranteed free from tuberculosis, or evidence produced by their having stood the tuberculin test.

'Yours very truly,

'DUNCAN McEACHRAN,

'*Chief Inspector.*'

The following is Dr. Higginson's report to which is appended individual details of each animal.

This report was submitted to the Select Standing Committee of the House of Commons on Agriculture and Colonization during the past session of parliament. It will repay careful consideration by livestock breeders.

ROCKLAND, June 9.

'I have the honour to report to you as follows regarding the experiments carried on by me under the direction of Dr. D. McEachran, Dominion inspector, with cattle affected by tuberculosis on the farm of W. C. Edwards & Co., Ltd., Rockland, Ont.

'In the spring of 1898, it was discovered for the first time that tuberculosis prevailed to a considerable extent in the above named herd, while at the same time the entire herd presented a robust, vigorous and healthy appearance and no outward symptoms prevailed whatever which would lead to the slightest suspicion that tuberculosis was prevalent in the herd.

'On accepting the appointment made by you to carry out certain experiments, and on receiving my instructions from Dr. McEachran, I proceeded as directed by him as follows :—Every animal in the herd was subjected to the tuberculin test and all animals which reacted under the test were separated distinctly from the animals which did not react, and since that date the two herds have been kept as positively and distinctly separated as if they had been many miles apart. The stables and premises in which the herd had been kept previous to the discovery of the disease were most carefully cleaned and thoroughly disinfected as directed by Dr. McEachran, with the use of carbolic acid, sulphur and creoline, and all were carefully whitewashed. A new stable and sheds were erected at some distance away in which to house the portion of the herd which was found diseased, and in summer the two herds have been kept in separate and distinct pastures far removed, so that thêre has been no contact whatever since the first separation was made. In the spring or early summer of 1898 both stables and sheds on the farm were carefully cleaned and thoroughly whitewashed, and I understand the same is to be now done again in a few days, and is to be an annual process each summer hereafter on this farm. In the season 1898-99 twelve calves were dropped from the cows of the diseased herd, three of which were lost within a few days of their birth, which loss I attribute to the immediate change to nurse cows without having any milk from their dams. Of the nine calves successfully raised, five were raised on nurse cows and four were raised upon their own mother's milk, which was sterilized before being fed to them.'*

'In May, 1899, I again tested the entire herd, including the nine calves so raised, with the following result :—The nine calves here named, four of which were heifers and five of which were bulls, all passed the test most satisfactorily, but in this test three of the cows which passed the test the previous spring reacted, and seven of the cows in the diseased herd did not react in this test. In the spring of 1899, I took a calf from an outside healthy cow, which cow I tested, but which did not belong to or have any connection with this herd, and I had it raised on the milk of one of the diseased cows, the milk being in its natural condition as taken from the cow. I also raised two late calves from diseased cows on pasture, allowing them to run with their dams the entire summer. In October I tested the three calves above stated, and all passed the test satisfactorily. In the same month before beginning to stable the cattle I again tested the healthy herd, all passing the test satisfactorily.'

'I will now deal with the results for the season of 1899-1900. Eighteen calves were dropped from cows which had responded to the test. This season one calf only was lost and none were raised upon sterilized milk. Six of these calves were raised

*That is very likely to be the case because the new-born calf requires the colostrum contained in the first milk to clear out the meconium from the intestines, so it is quite likely Dr. Higginson's explanation is the true one.

upon their own dam's milk, but never entered the premises in which their dams were housed, but were kept in entirely separate quarters and sucked their mothers in the open yard, not being allowed together longer than just a sufficient time for the calves to suck. Eleven calves from diseased dams were raised on nurse cows, in each case the calf sucking its own dam once before being transferred to the nurse cow.

'This spring I again carefully tested the entire herd with the following results :—In the healthy herd, including in its number the four heifers which were raised the previous year from diseased cows, all passed the test most satisfactorily. Of the six calves raised on their own dams as described, five passed the test and only one responded. Of the eleven calves raised upon nurse cows as described, ten passed the test and one only responded. In this test eleven cows in the diseased herd showed no reaction. In this eleven were included five which showed reaction in the spring of 1898, and were included in the seven which showed no reaction in the spring of 1899. The remaining two of this seven were slaughtered.

'Since the time I took official charge of this herd, all animals slaughtered from the herd were slaughtered under my supervision and inspection. In November, 1898, twenty-two animals were slaughtered. Of this number I condemned four as unfit for food. In the eighteen animals whose beef I found perfectly good for food, slight traces of the disease were found in the lungs, and in some instances in other internal parts, but in each instance the beef was perfectly sound and good. In April, 1899, I had slaughtered one cow whose carcass I found perfectly sound and good, but found slight traces of the disease in the lungs. In June of the same year I had another cow slaughtered whose beef I condemned as unfit for food. In December, 1899, I had two cows slaughtered whose beef I found sound and good. In one case, however, I found slight traces of the disease in the lungs, but in the other case I could find no trace whatever of the disease. In April, 1900, I had another cow slaughtered whose beef was sound and good, but I found slight traces of the disease in each of the lungs and liver. Again, in May of the present season two cows were slaughtered, in neither of which any signs of the disease were perceptible to the naked eye. One of these cows and the one killed in December, 1899, which showed no trace whatever of the disease were included in the seven which were among those which reacted in the spring of 1898, but which showed no reaction in 1899.

'The foregoing gives as briefly as I can put it the result of the experiments which have taken place, and the results from slaughter from this herd since my appointment by you in the spring of 1898, and if you will allow me I will give you the deductions which I personally draw from the experiments which have taken place. First, there is now no doubt whatever in my mind but that with reasonable care tuberculosis can be eradicated from any herd, and it is not at all necessary or desirable to slaughter valuable breeding animals. Nor do I consider it essentially necessary that the large expense W. C. Edwards & Co. have gone to need be gone to to the full by others in their desire to profit by the satisfactory and valuable experiments that have been carried out on their farm. Reasonable separation I consider desirable, and good drainage, good ventilation, and plenty of sunlight, as well as general cleanliness, I consider essential in preventing or eradicating the disease. Housing cattle too closely together in dark, unwholesome and ill-ventilated stables in my mind has done more to promote this disease than any other cause. That sound calves can be successfully raised from both diseased dams and sires is fully established by the experiments that have taken place here, for I may here state, that one of the three stock bulls kept on this farm is diseased and his calves come out as successfully as those of the sound bulls. Further, from the experiments which have taken place here it is clear to my mind that, while there is unquestionably danger in calves being nursed by their own dams who are diseased, this danger I, however, think exists more particularly in case of diseased udders, uterus or intestines, and in cases where the cow suffers from generalized tuberculosis ; but I think it possible that many tuberculous cows may suckle their calves if reasonable precautions are taken as was done in the experiment subsequently described. I would not, however, recommend this practice, it is attended by too much risk. That the disease can be cured I am unable to say ; the experiments which have taken place here do not warrant me in expressing an opinion. I am, however, firmly convinced that under such conditions of ventilation and proper housing as I have described, with separation, the disease can be checked, and in a reasonable time totally eradicated.

'I will simply add this, that the general condition of the stock on this farm, so far as all external appearances would indicate, has been of the very best, since my experiments began; that without the tuberculin test no discovery of the disease could have been made, and, while the test may not always be infallible, all that has transpired here to my mind most strongly recommends its usefulness where honestly applied as a great means of discovering and promoting the eradication of tuberculosis. All of which is respectfully submitted.

'I have the honour to be, sir,
'Your most obedient servant,

'GEO. W. HIGGINSON,
'*Veterinary Surgeon.*'

DETAILS respecting each animal which calved seasons 1898, 1899 and 1900, and their produce, in matter of experiments with tuberculosis, on farm of W. C. Edwards & Co., Limited, Rockland, Ont.

1898.

No. 1, Lady Lancaster.—Bull calf by diseased sire; sold when twelve months old. Twice tested.

No. 2, Madge Hamilton ; *No. 3, Bonny.*—Both had bull calves by diseased sire. Were twice tested, and were sold at about eleven months old.

No. 4, Grand Duchess.—Bull calf by sound sire. Tested twice, and sold at about five months old.

No. 5, Lady Augusta. Heifer calf by sound sire. Twice tested as a calf and then tested as a yearling. Nos. 1, 21, 31, 4 and 5 all suckled a nurse cow.

No. 6, Sittyton Verona.—Heifer calf by sound sire.

No. 7, Geanie Girl.—Heifer calf by diseased sire.

No. 8, Pine Grove Clipper.—Heifer calf by diseased sire. Nos. 6, 7 and 8 were raised on sterilized milk. Tested twice as calves and again as yearlings.

No. 9, Louise.—Heifer calf by sound sire. Twice tested as a calf and also as a yearling. Fed on sterilized milk.

No. 10, March Violet.—Bull calf by sound sire. Died when three days old. Cause of death due to change of milk.

No. 11, Darling.—Bull calf got by sound sire. Died about three days old. Cause of death due to change of milk.

No. 12, Mary Leslie.—Heifer calf by diseased sire. Calf a little premature and died about two days old.

No. 13, Minonette ; *No. 14, Annie Leslie.*—These calves were got by unknown sires and suckled dams on pasture. Tested once at about five months old and were sold to butcher.

1899-1900.

No. 1, Lady Lancaster.—Heifer calf got by sound sire. Calved in September, 1899. Dam reacted in both tests.

No. 2, Madge Hamilton.—Heifer calf by sound sire. Calved in October, 1899. Dam reacted in both tests. Both these calves (Nos. 1 and 2) were suckled by nurse cows.

No. 3, Bonny.—Died. Cast in ditch.

No. 4, Grand Duchess.—Bull calf, sired by sound sire. Calved in September, 1899. Suckled dam. Dam showed no reaction in two last tests.

No. 5, Lady Augusta.—Calf died.—Dam stood first test, but reacted in second.

No. 6, Sittyton Verona.—Not calved yet ; reacted in both tests.

No. 7, Geanie Girl.—Bull calf by sound sire. Suckled by dam ; calved in September, 1899 ; dam reacted in both tests.

No. 8, Pine Grove Clipper.—Heifer calf by sound sire; suckled by nurse cow. Dam stood the first test, but reacted in second ; calved in November, 1899.

No. 9, Louise.—Was slaughtered.

No. 10, March Violet.—Heifer calf by sound sire ; suckled dam ; calved in September, 1899. Calf reacted in test. The dam reacted in both tests.

No. 11, Darling.—Bull calf by diseased sire ; suckled dam ; calved in October, 1899. Dam stood first test.

No. 12, Mary Leslie.—Bull calf sired by diseased sire ; calved in September, 1899; suckled nurse cow. Dam reacted in both tests.

No. 13, Minonette.—Not bred last year. Stood first test.

No. 14, Annie Leslie.—Aborted. Dam reacted in both tests.

No. 15, Mildred Sixth.—Bull calf by diseased sire. Dam stood both tests. Calved in March.

No. 16, Amelia Leslie.—Heifer calf by sound sire ; suckled dam. Dam reacted in first test, but stood second ; calved in September, 1899.

No. 17, Canadian Rosebud.—Bull calf by sound sire ; suckled nurse cow. Dam reacted in both tests ; calved in September, 1899.

No. 18, Mildred Ninth.—Heifer calf by sound sire. Dam stood both tests ; calved in October, 1899.

No. 19, Violet Second.—Bull calf by sound sire ; suckled dam three times, and then was put on nurse cow ; reacted in test. Dam reacted in both tests ; calved in February, 1900.

No. 20, Canadian Rosebud Second.—Bull calf by sound sire; suckled nurse cow ; calved in February, 1900. Dam reacted in first test, but stood second.

No. 21, Lady Lansdowne.—Bull calf got by diseased sire; suckled by nurse cow; calved in February, 1900. Dam reacted in both tests.

No. 22, Rose of Autumn.—Heifer calf got by dieased sire ; suckled nurse cow ; dam reacted in both tests ; calved in May, 1900.

No. 23, Rose Bloom.—Heifer calf by diseased sire ; died in changing to nurse cow ; dam stood both tests.

G. W. HIGGINSON.

THE TUBERCULIN TEST.

Wishing to obtain the views of Mr. Edwards and others on the tuberculin test, I addressed letters to several whose opinions I considered valuable, asking a few pertinent questions, to which I received replies as follows :—

Mr. Edwards' Letter.

DEAR SIR,—I have seen nothing to lead me to believe that the tuberculin test has had any injurious influence on the course of the disease. It is by no means our opinion that the disease has been stimulated or aggravated by the application of the tuberculin test. All animals that we have tested two or three times continue as hale and hearty as they were previously, and not one animal in our herds has broken down or failed in any way since we began testing. I cannot say that we have proof that can be relied upon to the effect that the use of tuberculin has checked the disease, but we will not be surprised if we find that in some instances it does. We retested twelve months later all the animals which at first reacted, and of the lot four made no response in the second test. One of the four animals was slaughtered this autumn and on the most careful examination made with the naked eye no trace of the disease could be found. We believe all the same that the disease was there. Since beginning the experiments here we have raised calves on nurse cows, and on sterilized milk, and not one of the calves so raised has responded in the slightest degree to the test; and all have been carefully tested. We have now gone so far as to turn grade calves on to the diseased cows in pasture, and we also raised a grade calf on the milk of a diseased cow with the pail ; each of those that sucked the diseased cow in pasture was tested, as well as the one fed from the pail, and none of them responded whatever to the test. We have learned a good deal from those experiments, and when we are through you will be able to give Canada most valuable information on this subject. Meantime we will be glad if you will treat the whole matter confidentially. We do not think that the test is infallible, but we think it the safest present guide, and we are fully convinced that the honest use of it and a little care should stamp out tuberculosis anywhere. Close contact in confined and ill-lighted and ill-ventilated stables we are convinced is the great means of conveyance of the disease. We are now raising six fine bred calves on the dams, though they are entirely separated and only come together twice a day in open yards. Our belief is that this will prove a success We are well convinced that the disease can be stamped out in Canada and the Canadians will act foolishly if they do not do it.

Yours truly,

W. C. EDWARDS.

It will be noticed that Mr. Edwards has gone so far as to venture and succeed in raising healthy calves on milk of diseased cows. This must not be accepted as a precedent, nor must it be expected to be always successful :—true, calves or persons may for a time without becoming tuberculous use milk from tuberculous cows in which no udder infection exists, yet no one can tell when an animal which is non-infective may become virulently so by invasion of the udder by the disease. This practice should never be followed.

Mr. Edwards' experience, however, goes to demonstrate the harmlessness of the tuberculin test, and that it neither produces the disease nor stimulates it when it exists.

Dr. A. E. Moore, D.V.S., who is specially employed by the department for the purpose of testing cattle, replied as follows:—

DEAR DR. MCEACHRAN,—I beg to say in answer to the first question in your letter of January 11, 1900 : "Does the application of the tuberculin test in cattle have any injurious influence on the subsequent course of the disease ?"

My experience has been that it does not accelerate the disease. In the post mortem on the herd which I will call No. 1, of the slaughtering of which I inclose a detailed report, you will notice that while every one was found diseased on post mortem examination, only three out of twenty-two head which were tested 11 months ago, all of which reacted, were unfit for food. In the remaining number the disease was found encysted. The owner tells me he could see no difference in the health of the animals after they were tested; all thrived well.

In another instance, herd No. 2, some thirty head, were kept over a year after they had been tested; they continued milking just the same, made just as much butter as before the test ; on killing them a year after, all were found diseased, but only a few had generalized tuberculosis.

In answer to your second question : "Has it any beneficial influence on these ?" I am inclined to believe that there are cases where tuberculin has had a beneficial effect. In cow No. 11, in the report on herd No. 1, there was a reaction of $2\frac{3}{5}$ degrees a year ago ; there was no reaction this year at all, although I gave her a very large dose of tuberculin. On post mortem examination the disease seemed perfectly cut off from the healthy part by a strong fibrous cyst, and I am of the opinion that the contents of these encysted cavities would prove harmless even if free in the system, as they were unusually hard and calcarious. There were three other cows which reacted last year, and failed to react this time, but as the owner was not quite ready to kill them, I will report later. I have seen no evidence of new foci being started by the tuberculin test. I have tested, I suppose, nearly 10,000 animals, and I have never had even an abscess form at the point of injection. Even distant lesions do not seem to be affected, as I have killed many animals the next day after testing, and can see no difference in these lesions, no matter how slight they may be. The only thing I have noticed is, that there is more serum or odema at the point of inoculation in an animal that is diseased than one that is not.

Yours truly,

(Signed) A. E. MOORE, D.V.S.,
Inspector.

The following notes on the preparation of tuberculin were handed me by Prof. J. G. Adami, bacteriologist for the department, and are particularly instructive.

The mode of preparation of Koch's T. R. tuberculin is totally unlike that of the ordinary tuberculin such as is used for diagnostic purposes. The latter is a preparation of the glycerinated broth in which the tubercle bacilli have been grown. During the course of that growth the toxines or bacterial products gradually diffuse out of the bacteria, and the tuberculin consists of this fluid of growth from which the bacteria had been filtered off, and which has been concentrated down to one-tenth of the bulk until it contains from forty to fifty per cent of glycerine and to which further one per cent carbolic acid has been added. The process of boiling and evaporating down in itself would destroy any tubercle bacilli which may escape through the filter. The presence of so large a percentage of glycerine absolutely arrests and destroys bacterial growth of any kind. As an additional precaution the presence of the carbolic renders it absolutely aseptic.

Tuberculin R., or as it is more frequently spoken of, tuberculin T. R., is prepared in a totally different manner. It has been found by some observers that whereas some toxines and bacterial products diffuse out, others, and these frequently more potent, remain connected with the bodies of the different bacteria. Thus there are certain very active products which are intra-corporeal in the tubercle bacilli.

To obtain these active toxines is difficult, and the method employed by Koch has been to take very large quantities of young cultures, filter off all the product of growth, dry in vaccuo and rub up with fine sand in a mortar ; express and treat with distilled water, and to continue this process until all the bodies of the bacteria have been broken up, then this watery solution save the first is centrifugalised repeatedly. The centrifugalisation is repeated until at last no residue remains; this forms the tuberculin T. R.

This contains certain substances which are, according to Koch, insoluble in glycerine, and the reaction given is of a very much milder type ; there is not the same fever, but the immunising power, according to Koch, is more powerful.

It will be seen from this abbreviated description of the process of manufacture that the same safeguards of sterilisation are not carried out in this T. R. as with the ordinary tuberculin. What is more, even after repeated centrifugalisation, it is difficult to remove all tubercle bacilli from being in suspension, while further, it is extremely difficult to so press and bruise these bacilli that every one is killed and broken up. What Trudeau and Baldwin were the first to show, is, that when this tuberculin T. R. is prepared commercially, as a matter of fact in a certain number of samples, the tubercle bacilli are to be found upon careful centrifugalisation, and they went further and showed than when inoculated into susceptible animals, like guinea pigs, in a certain proportion of cases actual tubercles might develop at the point of inoculation and thus the animals become infected.

These observations of Trudeau and Baldwin have since been confirmed by several independent observers with the result that this tuberculin thus prepared has dropped out of use. But in any case it may be added, that the fact that 10 mm. of the dried culture of the bacilli are requisite to produce 1 cc. of this substance and the prolonged process of preparation have from the first rendered this substance altogether too expensive to be used upon cattle. Indeed, the fact already noted that this causes practically no rise in temperature (the most being one-half a degree Farh.) renders this absolutely useless for purposes of diagnosis either in cattle or in man.

The following letter from Dr. E. L. Trudeau, in charge of the sanitarium for consumptives at Saranac Lake, in reply to a letter from me, will be valuable in giving the highest testimony to the harmless character of tuberculin.

Saranac Lake, N.Y., December 21, 1899.

Dr. D. McEachran,
Montreal, Canada.

Dear Doctor,—Yours in regard to my having found living tubercle bacilli in Koch's T. R. tuberculin is at hand. Your position is perfectly correct in the matter, and the criticism of the gentleman who claims that tuberculosis in cattle can be caused by Koch's test tuberculin is entirely due to his want of knowledge of the subject. Koch's test tuberculin, which is used for cattle, is, as you well know, and as he ought to know, absolutely free from any germ life, for two very good reasons. First of all, its manufacture requires long hours of boiling, or of a temperature nearly equivalent to it, which would destroy many times over the most resistant bacteria known. Secondly, it is filtered through porcelain, which would prevent its containing any bacteria even if no heat at all had been used. T. R. tuberculin, on the other hand, is, as you know, a very much later production of Dr. Koch's. It is never used to test either cattle or human beings for tuberculosis, but represents an attempt at immunizing human beings against the disease. It is manufactured entirely without heat and without chemicals from virulent cultures of living tubercle bacilli which are supposed to be crushed beforehand by hours of rubbing in a mortar or some other device. Unfortunately it is impossible to crush all the bacilli by any means as yet used for this purpose, so that as soon as a solution of the body substance of the bacillus has been made, the only guarantee against this solution's holding in suspension living tubercle bacilli is obtained by centrifugating the suspension and pipetting off the supernatent fluid. It soon becomes apparent to one familiar with laboratory methods that if the pipette is inserted a little too far down, or if as the centrifugation causes a little swirl from the bottom to rise from the fluid, one is in danger of pipetting off living tubercle bacilli which have risen from the bottom, and no adequate protection against this error in technique has been proposed by Dr. Koch in his paper.

As soon as I began the manufacture of this substance it became apparent to me that this was a real danger, and the paper which D. Baldwin and I wrote, and which is referred to by the gentleman you speak of, shows that Koch's T. R. tuberculin, as originally put upon the market, did contain occasional living tubercle bacilli, and was therefore, at that time at any rate, unfit for use on the human subject as a means of immunization. I believe the more recent outputs of this T. R. tuberculin contain some antiseptic, or at any rate that this danger has been met in some way by the German manufacturers of the substance, but I have made no test of the later outputs.

You can assure the gentleman you speak of that Koch's original tuberculin cannot possibly contain living bacilli, and that it cannot possibly cause tuberculosis even in the most susceptible animals ; all of which I feel quite certain you have told him already.

Very truly yours,

(Signed) E. L. TRUDEAU.

Letter from Messrs. Parke, Davis and Company, on the preparation of Tuberculin.

DETROIT, MICH., U.S.A., December 14, 1899.

DEAR SIR,—We have your letter of the 12th. We are sending you, with our compliments, two vials of tuberculin, taken from our stock on the shelves. We feel absolutely sure that you cannot induce tuberculosis with this material. In the first place the cultures are heated to boiling, in order to make this material safer to handle. It is then filtered through a Berkfeldt filter, which removes the germs ; then evaporated over a steam water-bath and contains finally 50 per cent glycerine which of itself will, as we have repeatedly proved, in a short time kill tubercle germs. In order to test the possibility of tubercular infection from vaccine we have made a number of experiments, as follows: Virulent cultures of tubercle germs, also fresh tubercular sputum, was mixed with glycernated vaccine. After standing for several weeks large quantities of this material were injected into a number of guinea pigs. In no case did they become tubercular. Like experiments have been repeatedly performed in England. The report of Trudeau was made on the T. R. of Koch, which is entirely another matter, prepared in an entirely different way, and often does contain living bacteria. In other words, our tuberculin is treated in three separate and distinct ways, each one of which is practically sure to either remove or destroy all the germs of tuberculosis.

We are,

Yours respectfully,

PARKE, DAVIS & Co.,
Per M.

Dr. D. McEACHRAN,
Chief Inspector of Stock, Department of Agriculture,
Montreal, P.Q.

Letter from Prof. Ross, Bacteriological Department, Ontario Agricultural College, on the preparation of Tuberculin.

GUELPH, December 1, 1899.

DEAR SIR,—As I am at present in charge of the manufacture of the tuberculin, Prof. Harrison being in Europe, I am answering your letter of the 1st sent to him.

Our first step in the manufacture of the tuberculin from the broth cultures is to boil it for at least two hours, thus leaving no room for any possibility of the germs retaining any life. Again, in the process of concentration, the tuberculin is submitted to a temperature of between 85 and 90 degrees centigrade for from twenty to twenty-four hours, depending upon the amount to be concentrated. This heating alone would be ample to ensure the destruction of any living bacilli which might be in the tuberculin.

None of the T. R. tuberculin has been issued from this department ; it has been frequently stated by medical men, both in English and continental publications, that T. R. tuberculin does contain the living germs in many cases. This substance has never, to my knowledge, been used in connection with live stock.

Yours truly,

MALCOLM ROSS.

Dr. McEachran,
Montreal.

Letter from the Bureau of Animal Industry on the sterilization of Tuberculin.

WASHINGTON, D.C., December 4, 1899.

DEAR SIR,—In reply to your inquiry of recent date, I would say that all the tuberculin made, for use in diagnosing tuberculosis in cattle, in the bio-chemic laboratory of this bureau, is sterilized by heat.

Yours truly,

D. E. SALMON,
Chief of Bureau.

Other letters of similar purport have been received, but I trust the above will be sufficient to convince those who, moved by prejudice or ignorance, continue to assert that 'the most eminent specialists agree that in very few cases can it be applied without danger.'

As a matter of fact one might as well expect to see barley grow from putting whiskey into the soil as to see tuberculosis develop from the injection of tuberculin under the skin of an animal.

TUBERCULOSIS REPORT FROM PRINCE EDWARD ISLAND.

By referring to the report of Inspector W. H. Pethick, V.S., it will be seen that the efforts towards eradication of tuberculosis are meeting with the hearty endorsation of the stock-raisers of the island.

Mr. Pethick says :—

'During the past year I have had the pleasure of meeting a large number of farmers and dairymen at meetings held in various districts, and discussing with them the important subject of contagious diseases in animals, dealing more especially with tuberculosis in cattle ; I am glad to inform you that the stockmen of this province manifest increasing interest in this important matter. I may just say that I find our stockmen not only anxious to rid their herds of this disease, but willing to give every assistance to any movement that may have for its object the eradication of tuberculosis from the province.

In my opinion, this would not be a very difficult matter to accomplish ; the very limited extent of the disease on the island, consequently the small amount of money necessary for compensation ; the willingness of the stockmen to aid in the work ; our isolated position (geographically), our Provincial Stock Act providing for the quarantining and testing of all incoming cattle, that are not accompanied by a health certificate signed by an official veterinarian, and the valuable object lesson the accomplishment of this work would be to the rest of the Dominion ; encourage our people to hope that the matter may receive your favourable consideration.'

Laws of Prince Edward Island.

An Act respecting Tuberculosis in Cattle.

[Assented to May 19. 1899.]

Be it enacted by the Lieutenant-Governor and Legislative Assembly of the province of Prince Edward Island, as follows :—

1. In this Act the expression 'cattle' means bulls, cows, oxen, heifers and calves.

2. The Lieutenant-Governor in Council may from time to time and when deemed necessary appoint an Inspector or other officer for the purpose of carrying into effect the provisions of this Act.

3. Every person importing or bringing cattle into this province either for breeding, grazing, feeding or dairying purposes shall give immediate notice to the Inspector appointed in pursuance of this Act, and every person who neglects to give such notice shall incur a penalty not exceeding one hundred dollars.

4. All cattle imported or introduced into this province, accompanied by a certificate signed by an official veterinarian, showing that they have been submitted to the tuberculin test and found free from tuberculosis, said certificate giving the date of testing with a chart of reaction and a description of the cattle, with age and markings, and verified by affidavit if required, that the certificate refers to the cattle represented, shall not be subject to detention in quarantine unless otherwise ordered by the Inspector.

5. All cattle when not accompanied by the certificate and affidavit, if required, as by the next preceding section mentioned shall be detained in quarantine for one week under the supervision of the Inspector, and during such detention an inspection shall be made and the tuberculin test applied.

6. Cattle found free from disease at the end of the period of quarantine will be released, but should there be found tuberculosis in any of such cattle tested as aforesaid, such cattle shall be destroyed or disposed of as the Inspector shall direct.

7. If any cattle are imported or introduced into this province, or attempted to be imported or introduced contrary to the provisions of this Act, the same shall be forfeited and may be forthwith destroyed or disposed of as the Inspector shall direct, and every person who imports or introduces or attempts to import or introduce any cattle contrary to the provisions of this Act, shall incur a penalty not exceeding one hundred dollars for every animal so imported or introduced or attempted to be imported or introduced by him.

8. Any Inspector or other officer appointed under the provisions of this Act, may at any time for the purpose of carrying into effect any of the provisions of this Act, enter any common, field, or stable, cow-shed or other premises where he has reasonable grounds for supposing any diseased cattle may be found, and every person

who refuses admission or in any way obstructs or impedes an Inspector or other officer acting in execution of this Act, shall for every such offence incur a penalty not exceeding fifty dollars.

9. Every penalty imposed by this Act shall be recoverable with costs before any two justices of the peace, or any magistrate having the powers of two justices of the peace under the "Act respecting Summary Proceedings before Justices of the Peace."

This subject is worthy of consideration, and as Mr. Pethick remarks, the eradication of the disease from the island province would be a very valuable object lesson for the whole Dominion.

INTERCOMMUNICABILITY OF TUBERCULOSIS.

The following report recently received from one of the district inspectors, illustrates the relationship between human and bovine consumption. He says in reporting the testing of a herd in which a diseased animal was found :—

'The cow marked "diseased" is not the property of the owner of the herd, but belongs to a widow who sent her to be wintered to the farm of the owner of the herd —all of which except this cow are healthy—having given no reaction to the test.

This woman's husband died of consumption last spring ; she also lost a child from tuberculosis and shortly after her husband's death her dog showed symptoms of tuberculosis, and on destroying him I found him similarly affected.'

Fortunate it was that the owner of the herd discovered this plague-smitten creature before she had time to infect his whole herd, as, by cohabitation with them for the whole winter she would most certainly have done.

A HERD OF 17 DAIRY COWS LOST BY THE INTRODUCTION OF ONE TUBERCULOUS ANIMAL.

In a recent test made by Inspector Moore, he reports finding in a herd of 21 head no less than 17 tuberculous, 1 suspicious, and only 3 healthy. A diseased animal was introduced to the herd seven years ago, and no doubt the disease has been in existence, and accounts for the many deaths since then.

MANGE IN CATTLE ON ALBERTA RANGES.

In my report for the year 1898-99, I dealt with the subject of mange in cattle on the Alberta ranges. This disease, which had existed in the southern part of Alberta for a number of years, has, during the last two years, assumed a more aggravated form. It has extended over a larger tract of country, numbers of cattle having been reported as affected by this disease in the neighbourhood of Lethbridge and the Little Bow River, and in fact nearly the whole of southern Alberta from Calgary to the boundary line, east as far as Medicine Hat and Maple Creek, and north to the Red Deer River has been more or less affected.

By reference to the reports of the North-west Mounted Police for that year, it will be seen that the total number of cattle quarantined and treated for mange in the territories by the mounted police, was 2,018, which probably did not represent one half of the infected animals.

A dipping station was erected by the stock-owners at Rocky Coulee, 8 miles southeast of Macleod. This, however, owing to vexatious delays of one kind or another hindering the completion of the work, was not brought into use until too late in the season to have had as many cattle dipped as there should have been. However, Dr. Wroughton, who was the mounted police veterinarian in charge of the dipping chute, states in his report that 686 head of cattle affected by this contagious disease were treated at the dipping station.

In a letter which was received from State Veterinarian Knowles, he says, speaking of the cattle in northern Montana (the country immediately south) :—

'The condition of the scabby cattle on our northern ranges is bad, in fact so bad as to excite the alarm of our cattlemen. They are now almost ready to construct six vats in the northern part of the State. It was my desire, and I endeavoured to bring it about, that our northern roundup association appoint a committee of three to confer with a like committee appointed by your stock association: the committees to meet at some given point, confer about this matter, and work in unison towards its extermination, but unfortunately it was not accomplished. Could you not get a committee like this appointed by your association, and have the secretary write to the Montana people and request them to appoint a similar committee to take this matter in hand. It was a God-send to our cattlemen that the past winter was not a severe one. It is my honest belief that at least 30 per cent of the cattle in northern Montana are suffering from sarcoptic scabies."

The following is an extract from the bulletin issued by the same gentleman to the stockmen of Montana :—

"All cattlemen of long experience with this disease on Montana ranges maintained, until shown the psoroptes, that the disease was due to "hard winters ;" from the freezing and thawing of the snow accumulating on the backs of the cattle, and long continued cold winters. They say the disease has been particularly noticeable after our very hard winters, and that after an open, mild winter, but few cases of it have been observed. It is also said that the disease is much worse on the open plains than where there is shelter, such as is afforded by the "breaks" along the Missouri, Marias, Teton and other streams, and in the mountains. My observation has been that the disease persists with equal severity on the plains and in the sheltered places.

'It is difficult, under range conditions, to arrive at an accurate estimate of the number affected with the disease, but from my observations during the past year, would regard as a conservative estimate of the cattle ranging north of the Missouri River, and from the mountains to the Dakota line, that about three per cent are affected. This estimate refers to cattle plainly showing the disease, but there is no doubt that equally as great, or greater, percentage are affected, that during the warm summer months show no evidence of it until cast and carefully examined.

'The problem of promptly and successfully stamping out this disease, under range conditions, is one of considerable magnitude. The disease is easily cured under close domestication, where cattle are gentle and easily handled, but as is well known, range cattle are wild and difficult to manage, and when large numbers must be handled, the process of hand-treating them is slow and unsatisfactory, for it necessitates casting each animal to properly apply the remedy, and then if not carefully supervised by one of experience, some diseased part may be overlooked.

'I give it as my opinion that to successfully and economically handle this disease, it will be necessary to construct dipping vats in the infected areas, and dip the diseased cattle as sheep are dipped. There is no doubt but that the initial expense of this procedure will be relatively large, but taking into consideration the number of cattle to be dipped will minimize it, and, without question give better results in the end. The treatment so far adopted this year has been hand-treating with paraffine oil and sulphur, and the results up to date have been fairly satisfactory, where supervised by experienced men.'

During the winter a large number of animals suffering from this disease were treated on the various ranches, bulls especially. During the month of February I drove over a large portion of the Foothill country, and wherever I went I saw at nearly every ranch I stopped at, several mangy animals. In April I inspected a herd north of the Red Deer River, in which a large number were mangy. I heard of others in that district, and saw a number of mangy cattle near Gleichen.

With a view to awaken an interest among stockmen, circular letters were issued by the stock associations and distributed among their members, containing information as to the nature of the disease, and the manner of dealing with it, and urging each and all to work actively with a view to its eradication. An effort was also made by these associations to obtain a large attendance of stockmen at the annual meeting which was held at Medicine Hat on April 12 and 13, last. The meeting was the largest and most representative one of the kind yet held in Alberta.

The annual report of the board of management of the Western Stock Growers' Association commences with the following remarks on the subject of mange in cattle :—

'The various resolutions passed at the last annual meeting have been taken up during the year with varying results. It will be remembered that at that meeting a considerable discussion took place as to the prevalence of mange on the range, and a resolution was passed which was expected to be of sufficient scope to cover the subject. At a subsequent meeting of the board, however, on June 9 last, and at which Dr. McEachran and Commissioner Herchmer were present, the whole subject was again gone into most carefully and thoroughly, and the board became convinced of the urgent necessity of immediate and thorough action. The only practical way of getting at the root of the evil seemed to be to establish dipping stations at central points, for although individuals might gather and carefully treat their own diseased animals, still there is bound to be a percentage of strays whose treatment it would be nobody's business to undertake, and unless the treatment can be made universal it cannot be expected to be efficient.'

At the meeting, after a lengthy discussion, the following resolution was carried :—

'Moved by Howell Harris, seconded by F. S. Stimson, That the Minister of Agriculture be requested to order that upon the coming general spring round-up, all cattle affected with mange within the limits of our association's district be gathered, and that said cattle shall be driven to the nearest dipping chute and there be properly dipped under the supervision of a government veterinary surgeon, and discharged only when directed by such officials. That the North-west Mounted Police be requested to furnish at least one policeman to accompany every round-up and see that the law and orders in council governing contagious diseases be properly carried into effect.—Carried.'

The resolution passed at the general meeting dealing with mange was thoroughly discussed at a subsequent meeting of the executive committee, together with the means of most practically dealing with its recommendations, and the following resolutions were submitted and passed :—

'Moved by A. B. McDonald, seconded by W. R. Hull, That the secretary write to the Montana Stock Association intimating that parasitic mange exists on the Canadian ranges, and that it is reported to be equally prevalent among the Montana cattle to the south of the international boundary line. This association would respectfully request the co-operation of the Montana Stock Association in its efforts to eradicate this disease, and would be pleased to receive any suggestions as to the most practical method of dealing with it in an effective and simultaneously conducted manner.—Carried.'

'Moved by C. Kettles, seconded by R. Duthie, That the secretary and the southern manager draw up a circular and forward it to all members informing them of the steps required by the government to be taken this year for the eradication of mange. All animals showing the slightest suspicion of mange must be gathered by the spring round-up and dipped under the supervision of a government inspector, the district associations to instruct their captains of round-ups to gather every suspicious animal, irrespective of ownership, they find on the range. It is recommended that so far as possible all animals, whether apparently affected or not, be dipped, at least once during the year.—Carried.'

In connection with the former resolution Mr. Preuitt, of the Montana Stock Association informs the secretary, that the existence of mange on the Montana ranges is thoroughly realized, and that active steps are being taken to eradicate it ; while a more recent communication from the State Veterinarian contains the information that the northern part of the state is badly infected, and that it is estimated that no less than 30 per cent of the cattle there are suffering from this disease ; it also states that a number of dipping chutes are being erected and energetic action taken to stamp out the contagion.

Dipping chutes are now in course of erection or are already erected at the following places :—

Pincher Creek, 2, one at Sharpe's ranche, and one at the Dry Fork.
Rocky Coulee (Macleod), 1.
Little Bow (Lethbridge), 1.
High River, including Nanton and Sheep Creek, 3.
Maple Creek, 2.
Medicine Hat, 2.
Willow Creek, 1.

While it is hoped that one or more will be erected in the country west of Calgary.

Eighteen thousand pounds of mange dope is being suplied free of charge to the stockmen by the Dominion government, and will be distributed direct to the various points by the manufacturers, and it is confidently hoped with the thorough and hearty co-operation of every cattleman in the country that a very considerable step towards the final dislodgement of the disease will be effected this summer.

The Order in Council, dated July 14, 1899 being still in force, the administration of the quarantine under the authority of the Animal Contagious Diseases Act, and of this order was placed in the hands of the acting commissioner of the North-west Mounted Police to see that their provisions and the resolutions of the association were carried out, and arrangements were made for the veterinary surgeons of the North-west Mounted Police stationed at Calgary, Macleod, Lethbridge and Maple Creek to superintend the dipping, and Dr. John Hargreave, of Medicine Hat, was appointed local inspector for that district to assist in such work.

The following directions were issued to the veterinary inspectors charged with the administration of this quarantine :—

Directions for Veterinary Inspectors in Charge of Mange-dipping Stations.

You will visit the several dipping stations of which you have professional charge, as often as you can.

It will be your duty to assist the cattlemen employed in dipping by seeing that the vats and corrals are in good order, that all cattle, even those only slightly affected, are gathered and dipped. Where need be, owing to negligence or indifference of owners, you will, acting under the Animal Contagious Diseases Act and Order in Council of July 14, 1899, cause infected cattle to be brought to the dipping station, dipped and treated till cured, retaining them till all expenses are paid by the owners.

You will, as soon as a dipping vat and corrals in your district are prepared, conduct experimental dipping to ascertain exactly the requisite strength of the dip to kill the acari without injuring the animal. The vat holds 2,500 gallons, each barrel of soap, 400 pounds. Commence with 500 pounds of the soap in the vat full of water ; it should be dissolved in hot water and must be kept well stirred. After the animal has dried, examine with a lens the surface of the skin or portions of scab to see whether or not acari have been killed—if not, increase the strength of the solution till a curative effect is attained without injury to the eyes or skin of the animal. In passing them through the vat endeavour to have them retained a few minutes in the bath, and use scrubbing brushes on long handles to rub the solution well into the skin.

Calves may be held and scrubbed in the solution, holding the head well out of the fluid, which might irritate the eyes.

Pass the cattle through the dip as often as convenient, but not less than weekly. If there be only a few animals under treatment, they may be dipped two or three times a week.

The success of your work will largely depend on the thoroughness of gathering all infected animals off the range, the dip being of the requisite strength and being thoroughly applied to the skin by dipping and rubbing, and on your removing all sources of infection in the corrals—fences, trees and rocks—by lime wash or washing with the dip. Energetic work done this summer should eradicate this disease, but indifference, carelessness or wilful neglect may render what is done useless. Thus, it is clearly your duty to see that what is done is done thoroughly, and whenever owners neglect or refuse to treat their animals, it is your duty to enforce the provisions made by the Order in Council for such cases.

D. McEACHRAN,
Chief Inspector.

Directions were also given that their duties were to be performed with the least possible hindrance to the business of the stockmen, and that contact cattle were not to be rejected from shipment, but no animals showing any symptoms of mange or bald patches on the body were to be shipped. Permission was also given to owners of cattle, and cattle-dealers who wished to do so, to send animals affected by mange, under veterinary supervision, to the abattoir at Calgary. Movement of animals, in the quarantined district which were not suffering from mange, was also permitted, under veterinary supervision, so that the purchasing of the cattle, free from disease, for stocking ranches was not interfered with.

With a view to furnishing accurate information as to the true nature of the disease, and suggestions as to the best methods of dealing with it, the following bulletin, dated December, 1899, was issued by the department, and distributed among the stockmen in Alberta :—

SPECIAL BULLETIN FOR STOCKGROWERS IN THE NORTH-WEST TERRITORIES.

MANGE IN CATTLE.

This disease is due to irritation of the skin produced by minute parasites, *acari*, which resemble cheese mites, and like them may be seen by aid of a magnifying glass or low power object glass of a microscope : sometimes when numerous and the animal is held in bright sunlight they can be seen as minute whitish specks by the naked eye, or they may be transferred with the scab to the human arm, or the surface of a black paper when they will be seen in clusters on it, if exposed to the sun for a few minutes.

They belong to the order *Acaridae*, class *Arachnidas*, family *Psoroptes* (*Dermatodectes*).

The *Dermatodectes Communis* is that usually found in enzootic mange in cattle, and its discovery only should be relied upon to determine the diagnosis ; while several other conditions will produce loss of hair, *Alopecia*, it requires the actual presence of the *acari* to constitute mange.

It prevails during summer, but as winter approaches it becomes most apparent on the range, reaching its worst stage about the months of February or March, recovery appearing to take place as summer advances.

It commences at the root of the tail, neck, or shoulders, often spreading over the whole body. The itching is often considerable and prevents the animals from feeding or resting, consequently they become emaciated. From the abrasion of the skin by rubbing against fences, buildings, trees, or rocks, sores are produced, vessicles cover the skin and a viscid fluid exudes, which drying, forms crusts or scabs, which become hard, ulcers frequently forming under them.

The skin in chronic cases thickens and cracks, the hair falls off, the animals present a miserable appearance and, as winter hardships overtake them, death inevitably follows.

We are indebted to the late Professor Gerlach, of Berlin, for much valuable research work on the life history of these parasites. "They deposit their ova on the skin; when seven days old the *acari* are ready for procreation and probably about the 23rd day a second generation appears."

Gerlach makes the following calculation, estimating the product of each female as fifteen and allowing the procreative faculties to be in operation when these are fifteen days old, which affords some idea of the rapidity with which the parasites breed.

	Females.	Males.
1st Generation after 15 days..............	10	5
2nd " 30 days..............	100	50
3rd " 45 days..............	1,000	500
4th " 60 days..............	10,000	5,000
5th " 75 days..............	100,000	50,000
6th " 90 days..............	1,000,000	500,000

'Thus a male and female will produce 1,500,000 descendants in about three months.' *Fleming's Sanitary Science and Police.*

It takes 14 to 16 days from the date of transference of the *acari* to the skin before any marked symptons are noticeable, therefore, treatment should be commenced as soon as they are discovered and dipping or dressing should be repeated at least within fifteen days at most so as to kill the fresh crop before they commence breeding.

The disease spreads readily by the animals rubbing against one another whereby the *acari*, or the eggs, are transferred to the hair or skin ; also by rubbing against a fence, post, tree, rock or wall where an infected animal has previously rubbed.

The hands, clothing, halter, rope or anything that has the parasites or their eggs attached to it may spread the disease.

The treatment being followed in the present epizootic outbreak in Alberta consists of immersion in a solution of impure carbolic acid, quick lime, carbonate of soda and soft soap, (a modification of Zundel's prescription for sheep scab). This if necessary, can be made more effective by the addition of tobacco juice as recommended by Professor Ostertag, of Berlin. A tank connected at one end with the corral by an incline and with a chute and dripping pen at the other end, is so constructed that when in proper running order from 600 to 800 animals a day can be dipped.

In cases of mange in domestic cattle,—particularly bulls, they being specially exposed to infection, and specially prone to convey it to females,—they should be housed in isolated buildings, which should be frequently whitewashed as directed in section 3 of the Order in Council herewith appended.

Provided the stable is warm enough, the whole of the body should be washed with soap and water, well scrubbed with a broom brush, then rubbed dry and the following ointment applied with the hand or a stiff brush :

Sulphur........	8 lbs.
Oil of tar..............	8 ounces
Linseed oil (raw)................	2 gallons

Mix.

This ointment should be well stirred while being used ; apply it daily, washing with soap and water every second day, till the itching ceases.

Breeders should on no account neglect the very slightest appearance of mange in their bulls—here 'a stitch in time' will save not only nine but hundreds of nines.

As reports recently received by the department indicate that the disease exists to a considerable extent and is extending its area of infection,* active measures should be carried out by the joint co-operation of the stockmen and the cattle quarantine service, assisted by the North-west Mounted Police, as early in summer as weather will permit. Attention is specially called to the several clauses of the Order in Council, herewith appended, wherein the duties of every stock-owner in this relation are defined, as well as the authority by which quarantine measures can be enforced, and the penalties to which any person contravening the provisions of any of the clauses exposes himself.

Stock-owners having cattle affected with mange are strongly recommended to send all their range animals which have been exposed to infection to the dipping chutes, where they will be more effectively dealt with by experienced men who are provided with proper facilities, than they are likely to be by any extemporized arrangement at the ranch.

With a view to enable associations or private individuals who wish to construct dipping chutes for the more thorough treating of animals affected by mange the following directions and diagrams were also distributed among the stockmen :—

DIPPING VAT AND CHUTE.

The unfortunate extension of mange on cattle over a large area of the territories necessitates the active co-operation of every one interested in cattle-raising in a determined effort to stamp out the trouble.

Last summer a dipping vat and chute, the plans of which are given herewith, was constructed on plans adapted from the diagrams of a dipping vat and chute used by the Bureau of Animal Industry Division of the United States Department of Agriculture in their tick experiments in Texas. The general plan of the vat only is given, the accompanying corrals being omitted. It may be built in connection with

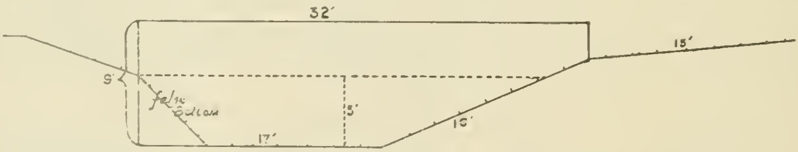


Fig. 1—Sectional view of vat and chute, showing depth.

a suitable corral, or one may be built for it, having a small pen at each end of the vat for holding the number of animals that can be run through at one time. The following plans are suggested, but they can be varied to suit the peculiarities of each location selected. If corrals already built can be utilized the cost of a dipping vat and chute should not exceed $150.

The Minister of Agriculture, Hon. Sydney Fisher, has promised to supply the dipping material ; this, with the free services of the Dominion Veterinarians and the assistance of the mounted police, should make the actual money outlay to the stockmen a very small per capita assessment for dipping the stock.

It is important that this pest be thoroughly stamped out. This can only be done by co-operation, as to be most effective the dipping must be done simultaneously throughout the infected districts. No infected cattle must be left on the range undipped to spread infection.

* Note.—686 head were dipped at Rocky Coulee.
Col. Herchmer reports a total of 2,018 head quarantined and treated during the past Summer.

The vat itself, Fig. 1, is 32 feet long at the top and 17 feet at the bottom. It is built of 4 x 4-inch. upright timbers placed 3 feet apart, planked inside with good 2-inch plank and well caulked. It is 7 feet wide at the top and 2 feet wide at the bottom. See Fig. 2.

The total depth of the vat is 9 feet, but it is never filled to a greater depth than 5 feet, and will then hold about 3,000 gallons. A short narrow chute, Fig 4a, leads to the vat, of which the last few feet slope to the level of the dipping fluid. A false

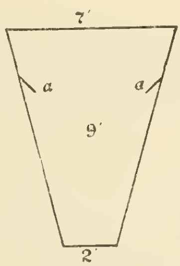


Fig. 2—A cross-section of the vat.

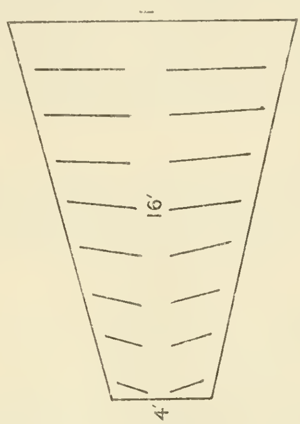


Fig. 3—Dipping platform.

bottom, Fig. 1, directly underneath the slope of the chute, compels the animals to swim forward to make room for those following, as a number are run through together. The vat is narrow enough to prevent an animal from turning round in it. Thus each animal is thoroughly immersed.

An incline, Fig. 4e, leads from the end of the bottom to the top of the farther end of the vat, where it is joined to the dripping floor, Fig. 4f and 3. This is a platform 16 feet long, 4 feet wide, where it connects with the incline in the vat and 12 feet wide at the farther end. It is fenced in with boards, slopes slightly towards the vat, and, like the incline, is heavily cleated to prevent the animals slipping.

The vat should be provided with a tongued and grooved cover, which for convenience of handling, is divided into three sections and is attached to one side ; that side, for the purpose of drainage, is built slightly higher than the other. The cover protects the dip from sun, rain and dust and should always be kept closed when the vat is not in use.

In using the dipping vat only as many animals are let out of the corral into the small pen at the end of the vat as can stand on the dripping platform, 8 or 10 head.

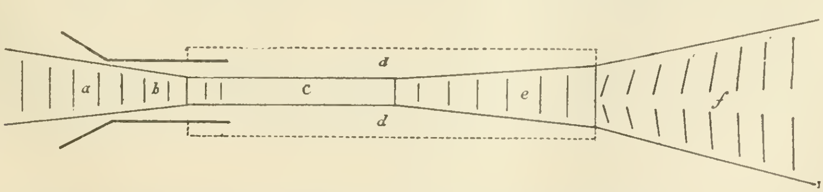


Fig. 4—Ground plan of the vat and chutes.

a—Chute leading to the vat.
b—Inclined floor.
c—Bottom of vat ; 2 feet wide.
d—Shows width and length of the top of the vat.
e—Incline leading from the vat.
f—Dripping platform.

They are let go through the vat one at a time and allowed to drain on the dripping platform for a few minutes that as little of the dip may be lost as possible. It is always well to retain one or two animals on the dripping platform, as the fresh bunch will enter the vat more readily if they see animals on the other side.

The Commissioner of the North-west Mounted Police in his report says :

'Mange which threatened to become serious in the Medicine Hat district a year ago has been successfully coped with, though it is probable that it will again show itself this coming winter and spring,' and again he says :

'All veterinary inspectors think that this disease has been controlled, and if the same measures are persisted in next year, as this just passed, it ought to be wiped out. I apprehend that it will require vigilance at the spring round-up and a careful application of the necessary remedies.'

D. Coristine, V.S., Maple Creek, in his report says :

'Mange was prevalent last winter and spring throughout the district, more especially in the Medicine Lodge, East End and Skull Creek localities. I made several trips to these and other points during the winter and spring and urged on the ranchers the necessity of dealing energetically with the disease as it appeared, so as to keep it under control as much as possible.

'I am pleased to say that the ranchers generally realized the importance of doing this, and did their best to keep it in check, thereby preventing it from assuming the proportions it otherwise would have done. When spring opened up and the cattle began shedding their old hair the mange began to disappear and did so to the extent that I have not seen or heard of a case since May last.'

The report of G. Harry Acres, V.S., shows that he inspected fifty-one head of mangy cattle at Nanton, Alberta, on August 21.

The following is an extract from report of Superintendent Deane, dated at Macleod, July 26, 1900.

'On the evening of the 18th inst., Inspector Burnett started for Clairesholm, where on the following day he examined three train loads of cattle, and rejected about 100 head on account of mange. This showed, he said, about the root of the tail and in some instances on the shoulder. The owners intend to dip them at the Sand Hills dip, and will notify him when they are ready to begin operations.'

J. H. G. Bray, secretary of the Medicine Hat Stock Growers Association and stock inspector of the district, writes:

'Our cattle have been remarkably free from disease of any kind, mange has simply almost disappeared. I don't think that we have had more than six beef animals turned back during the season.'

R. G. Mathews, secretary Western Stock Growers Association, writes:

'The number of animals treated for mange on the round-ups (I have of course no information of those treated privately, except that I know that the Cochrane Ranche treated in the neighbourhood of 100 head), was 74 head. This does not include the Little Bow district, as I have received no returns from there. There is no evidence of any fresh outbreak of mange so that one must come to the conclusion that the energetic measures taken last spring proved efficacious.'

By the combined efforts of the associations and individuals, large numbers of animals showing symptoms of this disease were treated during the winter, bulls especially on the larger ranches required particular attention, and many animals, both males and females which, had they not been so attended to, would probably have died during the winter, were thus saved.

This together with the slaughtering for beef of a considerable number of steers and cows affected more or less with this disease materially lessened the number of diseased animals found on the range during the past spring and summer, and it is very gratifying to be able to report that as a result of the combined efforts of the mounted police and the stockmen themselves, the disease has been almost eradicated, and this encourages me to hope and expect, that with the knowledge which stock-owners in this district now possess with reference to this disease, and how to deal with it, it will never again be allowed to spread over the range to the extent to which it occurred two years ago, when probably three or four thousand animals were affected.

I am happy to be able to say that during the shipping season now closed the inspectors at Montreal found it necessary to reject only one Alberta steer affected by mange.

The grateful thanks of the stockmen of Alberta will in due time be tendered to you for liberally supplying dipping material free of cost—thus enabling them at little outlay to themselves to deal successfully with a disease which was a serious menace to the ranching industry.

OPHTHALMIA IN CATTLE.

This disease, to which reference was made in my report for 1897-98 as follows, is again reported to occur occasionally, both in cattle and sheep, in Ontario and the Territories.

ENZOOTIC OPHTHALMIA IN CATTLE AND SHEEP.

A few cases of Enzootic Ophthalmia in cattle were reported from several sections in Ontario.

This disease, which is due to some local cause, is seen occasionally during the summer, in range cattle in Alberta, and some seasons to a somewhat alarming extent, and it is occasionally seen to affect flocks of sheep in Ontario. It is attributed to various causes, such as alkaline dust, minute flies, irritant pollen of certain unknown plants, and bright sunshine.

The symptoms are opacity of usually both eyes, with defluxion of tears, in some cases vision is seriously interfered with, which in range cattle is sometimes very serious, as they have to find their food and often move about over very irregular ground.

It generally runs its course and terminates in recovery of the eyes in about three weeks, sooner if occurring in domestic cattle which can be housed and treated. Occasionally cornitis with ulceration sets in and the usefulness of the eyes may be destroyed.

It is not contagious, but a number of animals in the locality may be affected by their being exposed to the same cause.

Quarantine measures are unnecessary in this disease.

TREATMENT.

Domestic cattle should be placed in a darkened byre and the eyes fomented with tepid water—and sponged with a solution of sulphate of zinc (3 grains to the ounce) in soft, filtered water. In range cattle it must be left to nature. We have usually found it end in recovery without permanent injury.

D. Coristine, V.S., Maple Creek, in his report refers to this disease as follows :—

'I have noticed this summer a great deal of the disease of the eyes mentioned as "ophthalmia" in Staff Sergeant Tracey's report for last year as occurring in a few cases in this district.

'The disease begins with a watery acid discharge from the eyes, and a white spot directly over the pupil from which an effusion gradually spreads over the eye till the whole organ is affected and assumes a whitish appearance. It is accompanied by an acute inflammation, which runs its course in two or three weeks, when it subsides, and the eye gradually regains its normal appearance.

'I do not think it is at all contagious, but that it is caused by alkaline dust, as I have noticed it nearly altogether during hot dry weather, and in localities where there are alkaline sloughs.

HOG CHOLERA.

I have much pleasure in reporting that this disease has rapidly decreased under the preventive measures employed in dealing with it, as will be seen by comparing the reports of two years—thus for 1898-99.

The number of animals slaughtered and the amount of money paid as indemnity was as follows :—

Number of animals diseased	2,166
In contact	2,579
Total	4,745
Indemnity paid	$15,048.82

1899-1900.

Number of animals diseased	742
In contact	707
Total	1,449
Indemnity paid	$5,918.41

1898-99.

Number of farms infected—

	Farms.
Western peninsula of Ontario	66
Toronto district	19
Niagara Falls district	5
Ottawa district	54
Berlin district	12
Port Arthur district	4
Manitoba	11
Alberta, N.W.T.	4
British Columbia	3
	178

1899-1900.

	Farms.
Western peninsula of Ontario	45
Toronto district	4
Niagara Falls district	2
Ottawa district	2
Manitoba	5
North-west Territories	1
British Columbia	1
	60

Referring to the reports of the inspectors who had charge of the administration of quarantine measures in the western peninsula, full details will be found.

Joseph Kime, V.S., Chatham, concludes his report by saying :—'Comparing this report with my report of 1899, shows that by the present system of dealing with them, hog cholera and swine plague can be completely stamped out, which has been done in this district.'

In the county of Essex nearly 50 per cent of the total number of outbreaks occurred. This is explained by Inspector M. B. Perdue, V.S., who states 'the recent severe outbreak has been confined to a line of farms fronting on the Detroit river, owned by some of the most extensive hog raisers in western Ontario.'

He points out the cause very clearly, as follows :—

'In Wayne County, and in many of the townships across the river, in Michigan, swine plague has been prevalent, and recently has been very severe. At this part of the river the current sets in towards the Canadian shore, and as there is always considerable offal washed up that has been thrown into the river from either side, it is quite probable that the infection came from this source.

'The disease followed the river front in a direction opposite to the current, taking in nineteen farms in a distance of four or five miles.

'On many of the farms the hogs had access to the river bank, and on no other farms except those having river front did the disease appear. The present regulations with regard to the quarantine and disinfection, when faithfully carried out, have proved very effective. For three years I have not found a single instance where a second outbreak has taken place on disinfected premises after the quarantine has been removed, although in almost every case the farmers have again taken up raising hogs.'

The report of J. R. Thorne, V.S., Wallaceburg, whose district, including Walpole Island, was a few years ago a hot-bed of the disease is still more satisfactory. He says : 'I have the pleasure of informing you that the health of stock in this district has been good during the past year, no contagious disease having existed with the exception of tuberculosis, actinomycosis and anthrax. I visited Walpole Island frequenlty but found no disease.'

Walpole Island which is an Indian reservation was a few years ago extensively infected and was the centre from which the infection spread in all directions on the main land.

The report of Inspector Orchard, of Windsor, Ontario, is also very satisfactory, as his district was for many years extensively infected, yet he reports only three outbreaks, 16 hogs being diseased and 33 in contact—the total indemnity being $192.25.

An outbreak occurred at Strathcona (South Edmonton), Alberta, which was reported by Inspector Sweetapple, V.S., North-west Mounted Police, and subsequently by myself. The disease was swine plague, the broncho-pneumonia form of the disease, it was confined to one herd and place, and was promptly and effectively dealth with.

Mr. Sweetapple in his report says :

'An outbreak of swine plague occurred at Strathcona, but the premises were at once quarantined and the disease entirely confined to one herd.'

These results are no doubt due in a large measure to the education of the people by the bulletins which have been freely distributed throughout the country. By these hog raisers are informed of the nature, causes and means of spreading such diseases and instructed in common sense practical preventive measures. On discovery of the disease they at once notify the inspector and the extension of it is prevented by quarantine being established and maintained till it is eradicated completely.

When we consider that this disease costs the United States close on $50,000,000 a year by losses in hogs, (the State of Iowa alone loses about $18,000,000), and that Great Britain and European countries also suffer severe loss from swine diseases, the healthy condition and comparative freedom from contagious disease of swine in Canada are matters for congratulation.

PICTOU CATTLE DISEASE.

I regret to have to report the continuance of this local disease, and that all our efforts to determine its exact causation having failed—investigations have been made by such eminent bacteriologists as Professor Wm. Osler, Dr. Wyatt Johnson and more recently Professor J. G. Adami, Pathologist, McGill University, without determining its true pathology. No preventive efforts have therefore been suggested by them, other than those employed by the department since it first undertook to deal with it twenty years ago.

Dr. George Townsend, D.V.S., has special charge of administering quarantine measures for the eradication of this disease. By reference to his report it will be seen that there were slaughtered as diseased 149 head, for which $1,151.99 were paid as indemnity, as against 112 head and $800.63 similarly paid during the preceding year. As provided by the Act, one-third of the value of an animal before it became diseased is allowed as compensation ; the value being determined by authorized appraisers.

The mode of procedure is as follows :—An owner of cattle on perceiving an animal showing symptoms of the disease in his herd at once notifies the inspector, who forthwith makes an investigation, and if he finds that it is a case of Pictou cattle disease, the animal is slaughtered, after appraisement, and the carcass either burned, or deeply buried and covered with freshly slacked lime. The premises are thoroughly disinfected ; disinfectants being supplied by the department, and a special officer whose duty it is to see that it is done in a thorough manner takes charge of the premises till they are disinfected to his satisfaction.

The disease prevails chiefly during the midsummer months, disappearing almost entirely during the winter. For instance, during the past twelve months, the period covered by this report in November, 1899. there were 12 cases, in December 5, in January, 1900, 1 case, in February 4, in March 5, in April 8, in May 10, in June 18, in July 32, in August 27, in September 15, and in October 12. It occurs most frequently on poor soil and weed-grown fields, but is not confined to these. Many animals are annually shipped from the district wherein the disease prevails, but in no instance has it been thus introduced elsewhere. Diseased animals have been made to cohabit with healthy cattle in byres and in fields without infection occurring. The prevailing popular idea that it is due to the cattle eating ragwort (*Senecio Jacobaea*), vulgarly termed 'Stinking Willie),' is entirely erroneous. That family of plants does not possess poisonous properties. Cattle have been fed on it as much as they could be induced to eat, they have been drenched with decoctions of it without producing any symptoms of this disease. Careful examination and laboratory analysis of the water in use by animals contracting this disease have been made without discovering anything suggestive of its cause.

So far it has baffled the combined skill of bacteriologists, pathologists, chemists, botanists, agriculturists and veterinary clinitians to define its true nature or cause. The measures employed have limited its area, and lessened the numbers affected. This is proven by its increase when there has been any relaxation in carrying of them out. Still it continues to lurk around and occasionally reappears in the original localities in spite of everything yet suggested as a preventive.

ANTHRAX AND SYMPTOMATIC ANTHRAX OR BLACK LEG.

These diseases continue to occur here and there throughout the Dominion, but in no instance has it caused serious loss, only a few animals dying at a time.

Mild outbreaks have been reported from the following places :—

ANTHRAX.

No. of Outbreaks.	Locality.	Province.	Inspector.	No. dead.
1	Ste. Thérèse	Quebec	A. E. Moore, D.V.S.	9
1	New Glasgow	"	" "	10
1	Bulwer	"	" "	3
1	Anagance	New Brunswick	J. H. Frink, D.V.S	1
1	St. John Co	"	" "	1
1	St. Andrews	"	A. E. Moore, D.V.S.	2

SYMPTOMATIC ANTHRAX.

No. of Outbreaks.	Locality.	Province.	Inspector.	No. dead.
1	Maxville	Ontario	J. Irvine & A. E. Moore	50
3	Whitewood Blackwood Medicine Hat	Assiniboia	R. G. Mathews & J. Hargrave	7
1	Edmonton	N. Alberta	C. H. Sweetaple	9

As explained in previous reports, these two diseases, although not identical, are very similar as regards causation, that is to say, they are each produced by rod-shaped bacilli which are spore-bearing. These differ mainly in the one which produces anthrax being aerobic, requiring oxygen to produce sporulation, and by the consumption of which in the blood they render that fluid incapable of maintaining life, hence its suddenly fatal character—affected animals usually die without symptoms being observed. While those producing black leg or symptomatic anthrax are anaerobic, do not require oxygen, and are supposed to kill by obstructing the minute capillary blood vessels, producing local tumefaction, usually on the hind quarters or shoulders, of a painful inflammatory character, which extends rapidly, becoming gangrenous, insensible and crepitant. Death may be sudden, but usually symptoms are observable for twelve to thirty-six hours. After death, if the tumour be cut open, it will be found black, gangrenous in the focus, and for a considerable distance around it the tissues are infiltrated by a yellowish serosity.

The anthrax bacilli and the spores die within a short time after the blood has ceased to be oxygenated by respiration, unless air be admitted to them by cutting up the carcase, but they sporulate rapidly if exposed to the air. According to Masselman. 'The spores produced after coming in contact with the external air are completely resistant to decomposition, and in bodies from which the skin has been removed the exposure of a large number of bacilli involves a more abundant production of spores than in those which have not been skinned' ; and according to some authors these spores themselves can pass through the different phases of their evolution in the soil and give rise to new generations, whereas if deprived of oxygen they rapidly undergo decomposition.

It will thus be seen that carcasses of animals dying from anthrax should not be opened; not only so, but the nostrils, mouth and anus should be stuffed with tow or cotton wool saturated in carbolic or creolin solution, and the body carefully placed in a wagon—on no account dragged along the ground—to the place prepared for burning it. If buried it must be eight feet deep in dry soil, and covered with one or two barrels of lime.

Anthrax is not communicable by contact of living animals ; at the same time owners of stock should at once remove the uninfected from any field in which a sudden death occurs, or if it occurs during the winter they should at once change the food and water.

SYMPTOMATIC ANTHRAX OR BLACK LEG.

This form occurs most commonly in young stock during summer, when from three to fifteen months old. Usually those most vigorous and thrifty are attacked, and seldom any large number at one time. It is usually fatal.

Treatment is rarely successful. The entire herd should be at once removed to another pasture, where the grass is less abundant, and they are less liable to become plethoric.

PREVENTIVE VACCINATION.

Anthrax vaccine and symptomatic anthrax vaccine, as now prepared by the Pasteur Institute, 56 Fifth Avenue, Chicago, Ill., can be employed as a preventive of these diseases. Three herds, one at St. Andrews, N.B., one at New Glasgow, P.Q., and one near Terrebonne, P.Q., were rendered immune from anthrax during the past summer by this means.

Owners of herds in which either of the diseases appear should at once procure fresh vaccine, and the syringe necessary for its use, and have the whole herd vaccinated according to the printed directions furnished with it.

Two vaccinations are necessary, No. 1 and No. 2 vaccine, with an interval of eight days.

SHEEP SCAB.

This disease which a few years ago prevailed in Ontario and the districts of Assiniboia and Alberta in the North-west Territories, to a considerable extent is now almost if not completely exterminated.

On December 20, 1899, three sheep brought from Ontario were rejected at St. John, New Brunswick, affected with scab.

During the past summer scab existed in the ridings of North Victoria and North Ontario, province of Ontario, twenty farms were quarantined and the sheep successfully treated under direction of your inspectors.

By referring to Prof. Andrew Smith's report, it will be seen that scab was discovered in some sheep imported from Wyoming, U.S., to Whitchurch, Ontario, in March last, which was also effectively dealt with, and was not allowed to spread from the infected farm.

Veterinary Staff Sergeant Hobbs, reports 'two outbreaks of scab in sheep in the Calgary district which have been successfully dealt with.'

It is to be hoped and expected that with the fuller knowledge possessed by stock-raisers generally of such diseases as sheep-scab no one will be so culpably negligent as to allow this disease to spread in a flock—when by cheap and simple means it can be speedily arrested and exterminated.

INSPECTION OF STOCK YARDS AND CARS.

By reference to the report of Mr. Auger, inspector of live stock cars and yards, it will be seen that the railroad companies are alive to the requirements of live stock transportation with a minimum of inconvenience to those engaged in it. The complaint of detention of animals in the yards after being unloaded has been removed, cleaning and disinfection of cars are now being satisfactorily performed.

There has also been some improvement in cattle and hog cars passing in transit from points in the United States.

He also reports much needed improvement in the railway stock yards, and the willingness shown by the railway companies to meet the requirements of the trade, by providing water and shelter for the stock. Room for improvement still exists in many of the yards at outlying stations where stock have to be fed and watered en route, in some cases they have to be fed and watered in yards late in the season where they are knee-deep in mud, a condition difficult of prevention yet capable of great amelioration.

ACTINOMYCOSIS (LUMPY JAW).

As explained in previous reports this disease is met with in all countries and climates and occurs in cattle of all ages. Bollinger was the first to recognize the nature of the disease in cattle, he was followed by Siedamgrotsky, Perroncito, Rivolta and Huhn and Johnne.

It is due to a fungus ; Actinomyces, described by Fleming as 'producing nodules consisting of myriads of the vegetable organism designated as above, each mass being made up of smaller nodules, these individually containing nests of felted fungi. Each cluster of the actinomyces having a characteristic daisy outline and radiating lines springing from a dark centre.'

The fungus is classed with the rusts or moulds of plants ; it is found on the grasses, and being taken into the body, usually by the mouth, where, owing to some abrasion of the mucous membrane of the gums, or tongue, or it may be the intrusion of a stalk of grass or spear of barley into the gums or between the teeth the fungus or its spores gain an entrance and work their way into the tissues, invading the bone tissue of the jaws where it works its destructive effects which so honeycomb and destroy the bone tissue as to loosen the teeth which fall out and large lucerating sores form in the mouth or face, or both.

It is a mistake to suppose that this is a disease specially affecting bones. It is often seen in the tongue, gums, buccle membrane and palate as well as the upper and lower jaw ; in the pharynx, larynx, nasal cavities, trachea lungs.

Dr. Osler and I found it in the cavity of the skull in an imported bull which died with symptoms of brain lesion in the Lévis quarantine. I have seen it in the muscles of the thigh in a steer, the specimen being sent by Dr. Wroughton, from Calgary. 'It has been seen in the udders of pigs and the shoulder of the horse.'—(Ostertag.)

TREATMENT.

It is, generally speaking, incurable, yet experiments made by the United States Bureau of Animal Industry at Chicago, in 1893, on 'post mortem examinations being made on 185 animals treated, there were found to be cured 131, or about 71 per cent. The number showing internal lesions was seven, or 3·8 per cent of the animals in the experiment.'

The treatment was the internal administration of from two to three drachms of iodide of potassium from five to six days, or till the toxic action of the drug is produced (iodism). The manure getting dry, hard and coated with thick mucus ; catarrh of the digestive tract, and even hemorrhages may take place. When these symptoms are seen, stop the drug for a week, and give a dose of epsom salts and mashes.

The medicine is given as a drench, dissolved in water. Local impirical applications are freely advertised as cures, consisting chiefly of very powerful blistering combinations of several powerful ingredients, which, in cases where it is recent and local, will usually destroy the diseased tissues, producing a large slough which sometimes arrests the progress of the disease. When, however, it involves deep-seated organs, the local treatment is not to be depended upon.

It has never been known to be communicated from animals to man, and numerous experiments to produce it from animals to animals by cohabitation, and even inoculation have failed. Bollinger carried out a series of experiments which established that the disease could be communicated from cattle to cattle. Previously, Bollinger, Harz, Perrioncito, Siedamgrotzsky and Johnne had failed, but subsequently, by using fresh material from the living animal, both Johune and Ponfick succeeded.

Experiments conducted by Prof. Osler and myself at the Montreal veterinary college failed.

As stated in a previous report, neither the fungus nor its spores migrate far from where they first gain entrance; thus, if the tongue be the organ affected, it is usually confined to that organ; if the gums, it lodges in the cancellated tissue of the maxillary bones; but, of course, some spores may be swallowed, or passing into the blood stream be carried to other organs, though it would seem that this rarely happens.

I have for seventeen years past known Indians in the North-west Territories consume the carcasses of Big-jawed cattle whenever they could obtain them, and usually carcasses of such as have been shot for this disease and left on the prairie are carried off and eaten by them, yet I have never known of a single case of the disease among any of the tribes, Blackfeet, Bloods or Piegans, of whom I have intimate knowledge ; therefore, I conclude that communication through consumption of flesh from Big-jawed cattle by men, if it occurs at all, is very rare, wherefore the wholesale condemnation of such meat is an error, nay, a needless waste. I believe about 90 per cent of such carcasses are quite fit for food, but this should be so determined by the inspector. The European system of condemning it when the disease is general, but passing it when it is only local, should be followed here also ; at the same time as all beef is not killed at abattoirs the public must be protected, as well as the reputation for healthfulness of Canadian cattle, and inspectors must continue to prevent such cattle from being shipped abroad, or from being killed for food except under supervision. They must send them to the abattoirs, thus placing them under the control of the municipal health boards.

Reports of actinomycosis continue to be received from various parts of the Dominion, but in decreasing numbers, and owing to the action of the civic boards of health, especially that of Montreal, in seizing and condemning all animals affected by this disease, and the prohibition of shipment of them by your port inspectors to Britain, it is no longer profitable to bring such cattle to the shipping port. Nine animals only were rejected at the shipping ports for this disease during the past year.

HORSES.

CANADIAN HORSES IN THE BOER WAR.

The following table gives the numbers of horses sent to South Africa with the different Canadian contingents :—

	Horses.
With Col. Otter's regiment	5
First contingent Royal Canadian Mounted Infantry	375
Second contingent Royal Canadian Mounted Infantry	375
Strathcona's Horse	595
General Hutton	3

Purchased and exported to South Africa by Major H. S. Dent, Remount Officer for Canada—

Cobs.	Artillery.	Cavalry.	
500	905	2,380	3,785
		Total	5,138

It is gratifying to know that Canadian horses were found most serviceable, and distinguished themselves as did the men and officers in the various branches of the service.

Most of the Royal Canadian Mounted Infantry horses, and all of Lord Strathcona's riding horses, were western-bred cow ponies, bought on the ranches of Alberta. They are described in a report made by me to His Lordship on completion of their purchase as follows :—

'I am glad to report that I have secured 536 horses, about 15 to 15·2 hands high, a few are about 14·3. Ninety-five per cent are thoroughly broken to cowboy work, taught to rein by the neck, stop suddenly, turn on the hind feet as a pivot, stand on the prairie with the reins over their heads, ford and swim rivers, and go at a rapid pace up and down hills. They are stout animals, with good short back and strong quarters, good bone and as active as cats ; horses which know nothing of stables or grooming, accustomed to be ridden half a day or more, and at night simply stripped of saddle and bridle and turned loose to find their food. The riding horses and pack ponies were bought at Macleod, Pincher Creek, along the Foot Hills, at High River, Calgary, Medicine Hat, Maple Creek, Regina and Lethbridge. Sixty-six wagon horses were bought in Montreal, mostly Ontario bred, and a few province of Quebec horses, 15 to 15·3 hands, stout short-legged horses, with good action and about 1,200 to 1,300 pounds.

In conclusion, I would say that hitherto it was not considered possible to purchase horses in Canada for army purposes ; there are thousands suitable for mounted infantry ; not all broken, it is true, but they are being broken now.

'I feel convinced that the mounts will be so approved by the generals at the front that the question will be asked, Can more be got quickly ? They can.'

The following extract from a letter just received from Major Dent, on the subject of Canadian army mounts, is worthy of consideration :—

'I was pleased altogether with the class of horses which was brought before me, but I think great improvement can be made by using the English thoroughbred stallion as a sire, and doing away with the American trotting sire, which, in my opinion, has done a great deal of harm to Canadian horses. I attribute the long back and weakness of back ribs and bones, also smallness of bone below the knee, to the American trotter. I wish to urge on the Canadian farmers and young men in Canada to take to riding instead of always driving. They would add greatly to their health and happiness by so doing, and enhance the value of their horses 50 per cent. It is difficult to find in the country districts a horse that has ever had a man on its back.'

I am glad to learn that Major Dent's advice is already being acted upon, as he is selecting three thoroughbred stallions for exportation to Canada.

The following letters from Colonel Steele, commanding Strathcona's Horse, places Canadian horses to the front for mounted infantry and scouting purposes :—

PARRDEKOP, August 6, 1900.

MY DEAR DR. MCEACHRAN,—We are with General Buller, and have been continually marching and having occasional 'scraps' since we left Newcastle some two months ago. The regiment is in fine shape and highly thought of by those in command. I saw in the papers some attacks upon the horses bought by you. I regret it very much and wrote you to-day on the subject.

I wish to assure you that the horses are the best in this army. Two squadrons had the 450 spared and they had to do all the hard scouting and advance guard work, while 'C' squadron with the Argentines had to be spared for a long time. We have lost very few Canadians, and have changed our other remounts several times.

We go out to assault a strong position on which are two guns and two thousand men. I hope we shall have good luck there, but we must suffer severely no doubt. Sir Redvers Buller will be in command, and if we succeed our march will be continued to the railway station on the line from Pretoria to Delagoa Bay and assist to corner up a good many. We have had several men killed, wounded and missing, also about twenty horses shot under the riders. One of your big Montreal horses got shot in the adbomen, left side, but did not mind it. We had quite a fight that day, but we were lucky in having none killed, but had several wounded.

With kind regards,

Yours faithfully,

S. B. STEELE.

Dr. D. MCEACHRAN,
Montreal, P. Que.

STRATHCONA'S HORSE,
PARRDEKOP, August 6, 1900.

DEAR DR. MCEACHRAN,—Since the 1st June the regiment has marched something over 700 miles, and the Canadian horses which you purchased have stood it very well. It is the opinion of officers and others who have looked at the horses that they are the best that have been imported into the country, and outside of the native bred pony best fitted for the work.

We have been constantly on the march since joining General Buller's forces, and although we have not been in any real engagement the men have been exposed to sniping, and have occasionally met the enemy in considerable force with guns. On all occasions the work was done to my satisfaction, and Lord Dundonald commanding the 3rd Mounted Brigade, to which we were attached, has told me that he thinks the corps a very fine one.

We are halted for a couple of days here and will join in General Buller's advance northward to-morrow.

I am,

Yours faithfully,

S. B. STEELE, Lt.-Col.

Dr. MCEACHRAN,
Principal, Montreal Veterinary College,
Montreal.

HINTS TO OWNERS OF HORSES RUNNING AT LARGE ON THE PRAIRIES.

Examine your horses feet at least once a month, remove overgrowth of horn with a sharp pinchers or rasp, thus preserving the form of the foot and assuring level and true action.

Overgrown feet if neglected for any length of time will split, toe cracks and quarter cracks are thus produced.

When the foot grows laterally it distorts the whole limb and the horse acquires a habit of in-toed or out-toed movement. These defects of the feet and limbs constitute insuperable objections to the purchase of horses for army purposes or any purpose in fact, and in the cow-pony class are the faults for which most will be rejected by remount officers.

Break your horses by kind and gentle methods ; an unbroken horse or one only partially broken, if bought at all will in no case bring its full value.

Horses kept for sale should be ridden sufficiently to gentle and educate them as to mounting and dismounting, starting and stopping, turning by pressure of the reins (made bridlewise), and change the gaits and paces at the will of the rider.

GLANDERS

Is a specific incurable disease of horses, but communicable to man by accidental inoculation. Horses, asses, goats, cats, guinea pigs, field mice are all susceptible, while rabbits, sheep and dogs are slightly so. Cattle, swine and white mice are immune.—(Crookshank.)

It occurs wherever horses are found, and has been described in the most ancient history of veterinary science. It is met with in an acute and in a chronic form, the former may kill in a few days, while the latter may exist for months or years, the animal continuing to work and enjoy fairly good health, yet be capable of infecting other animals or attendants.

The term Farcy is used when tumefaction goes on to ulceration of the lymphatic glands of the thighs and legs or shoulders.

It is characterized by nasal discharge of heavy specific gravity and glutinuous nature which sinks in water, and adheres round the nostril.

The discharge is usually from one nostril, is constant though not excessive in quantity. The sub maxillary glands are swollen hard and adherent to the jaw ; little nodules form in the nasal mucus membrane, at first yellowish in the centre, with a diffused red areola, followed by ulceration and the production of chancres with a mouse-nibbled appearance, depressed centres and raised irregular edges, with a tendency to become confluent. In advanced cases the purulent discharge may be mixed with blood.

When the lungs are involved, cough is a prominent symptom.

It is due to a microbe (*bacillus mallei*), a motile rod-shaped, straight or slightly curved bacillus, which is aërobic, lives in air; fortunately it is not very tenacious of life. It dies if exposed for two minutes to a temperature of 100°. Hot and dry weather favours its destruction, while cold and wet weather retard it.

The destruction of the bacilli by the desiccating influence of the hot dry air of the Canadian climate, more especially in the far west, is the best possible safeguard against the continuance of glanders in the ranching country, and by a knowledge of this fact we can understand how this disease may be completely eradicated if all horses affected by it are quarantined and killed, and care taken that no fresh importations of glandered horses are permitted.

As tuberculin is a reliable test for tuberculosis, so mallein is an equally reliable test for glanders. When injected subcutaneously, if glanders exists, it produces a rise in temperature, and a local painful tumefaction at the point of injection, which does not appear if the animal is healthy. By this means any doubts as to the diagnosis by clinical examination can be settled at once conclusively—for it is a very reliable test.

Glanders, fortunately, in the older provinces is rarely met with. Five horses were destroyed in Ontario on one farm, and one more, which had been brought across for racing purposes to Niagara South, was shot because it showed symptoms of this disease.

Ninety-one horses have been shot for glanders in the North-west Territories, and eighty horses or bronchos in Manitoba, during the past twelve months.

In the majority of cases the trouble has been introduced by bronchos imported from the United States.

A large number have been tested with mallein in the Territories and Manitoba. In all cases the shooting of the horse is followed by testing his companions—isolating suspects and thoroughly disinfecting the premises.

The disease is now well under control in the country, but, unfortunately, fresh importations often come in, and in certain stages, unless mallein testing is resorted to, the most careful expert may not detect any indication of the disease on inspection.

TYPHOID FEVER IN HORSES, IMPROPERLY CALLED INFLUENZA.

As early as 1867 I differentiated between influenza and typhoid fever in horses as will be seen by referring to page 164 of 'The Canadian Horse and his Diseases,' where I say, 'Until lately, typhoid fever was not recognized in veterinary nosology as a primary disease, although as an accompaniment of epidemic diseases, such as strangles, influenza, &c., we were familiar with it in all its forms.

'It now occurs in forms so well marked that we are justified in giving it a place in professional nomenclature as a distinct disease.'

At that time it was attributed by me to influences which interfered with the general health and vigour of the animal, among which stand pre-eminently overcrowding, improper ventilation, confinement in damp filthy stables, drinking bad water, holding in solution decomposing organic matters, insufficient nourishment and undue exposure, together with what may be termed generally, atmospheric causes.

Since that time (33 years) innumerable opportunities have occurred to study it in all its varying phases. Since first engaging in horse-breeding in Alberta, seventeen years ago, I have had almost yearly experiences of it, and some years encountering heavy losses from it.

While the term typhoid fever is applied to this disease, it must not be supposed that it is identical with typhoid fever in man, as a matter of fact 'Eberth's bacillus does not occur in equine diseases and its inoculation in the horse remains without effect' (Mossleman). It has its analogue in the so-called mountain fever so prevalent in man during railroad construction in the foothills and mountainous sections of the west, as was seen during the construction of the Canadian Pacific Railroad, not only were large numbers of the workmen affected but many of the Blackfeet Indians died in 1883 from this form of typhoid along the railway. In 1898-1900, during the construction of the Crow's Nest Pass Railroad, hundreds of cases and many deaths occurred from it.

Equine typhoid fever, prevailed extensively and caused severe losses to contractors during the construction of the Calgary and Edmonton Railway and hundreds of horses died from this and carbuncle of the feet and legs during the construction of the Crow's Nest Pass Railroad also.

It has been reported recently by Veterinary Staff Sergeant Mountford, V.S., North-west Mounted Police, Prince Albert, Veterinary Staff Sergeant Sweetapple, V.S., North-west Mounted Police, Fort Saskatchewan, and S. C. Richards, D.V.S., Grand Forks, B.C.

Being informed that Mr. J. H. Macfarlane, an extensive horse-breeder at Battleford had sustained severe losses and discouragement by the disease, I wrote him and requested to be furnished with a statement as to his experience and observations ; in reply I have been favoured by receiving the following very lucid description of the disease from him.

D. McEachran, Esq.,
Chief Inspector of Stock,
Montreal.

Dear Sir,—Replying to yours, would say that I am pleased to have the opportunity of giving you any information in my power. Have been breeding horses in the Battleford district for twenty-five years, and have lost a large number during that time. I have had no trouble with horses that are constantly stabled, but have had serious losses among those running on the range, and at pasture. Pink eye started in this district early last spring, which caused a large percentage of the mares to abort, and also killed many of the foals. Would say the loss of foals was fully 75 per cent. Nearly all the older ones recovered without treatment ; that disease seems to have run its course, as I hear no more about it. The drawback in the horse-breeding industry is what is called here typhoid fever. Symptoms are dulness, tucked up flanks, loss of appetite, costiveness, constant standing, legs swell from feet upwards, swelling on belly, which in time extends from sheath to breast—drinks freely in first stage, heaving at flanks, passes wind freely, bowels rumble greatly, in females water dribbling—males, pendant sheath—eyes bright, pendant head, back arched ; when walking will strike hind feet against front ones--sore throat, no cough or discharge from nostrils. The heaving at flanks and pulse quickens as disease progresses, patient stands till exhausted, then falls and dies at once without a struggle. In some cases this disease runs its course in ten days, in others will last for months. Many of those that recover are of little use, most of them being weak in the spine. This disease seems to be hardest on colts two to four years old, as it usually attacks one of those ages first. It has always been my custom to isolate affected ones, and to treat according to the best method known here, but so far have had very poor success. Some owners will allow an affected one to remain with the bunch, and perhaps lose only the one. Others have tried the same thing and lost half the bunch. Some years ago, a three-year old filly took this disease; I at once placed her in a loose box, but she became so excited that I put an aged gelding in with her for company ; they remained together till shortly before the filly died. The gelding is still hearty at 24 years old. Again, last fall I allowed a three-year old gelding that had this disease to run with a bunch of twenty head. The colt died after being sick two months, but all the rest of the bunch are still in the best of health and condition. This disease is just as hard on the native Indian pony as on horses of a higher grade. It has been a scourge all through the Saskatchewan district since I came here, and unless some treatment can be found that is effective, the horse-breeding industry will degenerate into breeding ponies, on the principle that if you lose a pony you will not lose much.

The treatment prescribed by the veterinary surgeons who have been in Battleford district has been a failure. In my opinion, the flies have more to do with this disease than we are aware of. They are so numerous as to be a perfect scourge. To give you an idea of what stock have to stand in that way, we began making smudges on May 12 last, and kept them going constantly until September 12. This disease usually attacks during the months of July, August, September and October, when the days are very warm and nights cold; this seems to be the hardest time, probably because the horses are then moulting. It is hard to tell where and when this disease will attack. It broke out last summer among my Clydesdale fillies, with the result that I lost one three-year old, one two-year old and one yearling—one yearling colt recovered. My Clydes have always been carefully wintered in comfortable stables, and on account of always being strong and healthy, thought them proof against this disease, but found

I was mistaken. I may say that they were allowed their liberty as soon as the grass was good in spring. Many ranches are from 25 to 100 miles distant from a veterinary surgeon, and the ranchmen consider it as well to let the horse take his chances as to go that distance to consult one, but if those men only knew how to treat the patient, they would keep a supply of the necessary medicine on hand. Were I allowed to offer a suggestion as to the best way to prevent the loss in future, I would say the most practical move your department could make is to have circulars printed, giving symptoms and treatment, with full directions about isolation and fumigating infected stables; have those circulars reach every farmer and rancher in Saskatchewan district. Where there are no druggists, storekeepers could keep a stock of the required medicines on hand and supply the surrounding country. If this could be done, I am sure it would save many thousands of dollars to the settlers each year. Should you consider the above worth consideration, I would advise prompt action being taken.

I have been informed that there has been considerable loss in stabled horses at Saskatchewan, Rosthern, Duck Lake and Prince Albert. From the symptoms given me by some of the unfortunate ones, I am satisfied it is this same fever. One Rosthern man told me he had lost twelve out of twenty brought from Manitoba four years ago. In low swampy regions this disease is much worse than on high dry parts, and it appears, the farther north we go the worse it is. You are probably aware that in many parts of Saskatchewan district there is considerable bush land, also many small lakes and swamps.

Horses like to go in the water and feed on the tender grass. In bush parts there is a rank growth of peavine (wild pease) that horses feed on, as soon as the flies will allow them. At that time the prairie grass is about cured. Might not the change from dry to green feed have some effect? That is always the most dangerous time. Another thing I should mention is the sudden changes in the weather, when suddenly a cold north wind will bring up as cold a rain, and although it knocks out the flies and allows horses to feed, still their appearance shows that they have suffered. Am not at present able to state the losses in horses within the last year. Breeders in this part are so discouraged by heavy losses, I am sure that anything you can do will be highly appreciated.

Any further information you may require about this disease and district will be cheerfully given to the best of my ability.

Yours truly,

J. H. MACFARLANE.

The following report on this disease has been furnished by J. J. Mountford, V.S., North-west Mounted Police :—

'The fever I spoke of in my report I have often discussed with the different medical men in Prince Albert, and they say it is the same as the typhoid in the human being.

'On post mortem examination you will find perforation of the intestines and the most common cause of death is blood-poisoning, though rupture of the intestines is not uncommon.

'The influenza is similar to the influenza I have seen in western Ontario, and the symptoms vary much and depend on the organ most affected.

'The horses which are running on the open range suffer most from the above diseases, and the horses which are in the stable and are not allowed to run out at all and watered at the river are seldom affected.

'The cause of so much sickness among the range horses is, I am satisfied, caused by the horses eating and drinking out of sloughs which are full of water in the spring and gradually drying up during the summer. The vapour which rises off of one of those sloughs is putrid and the country is full of them.

'May say I have often seen a farmer have his stable on the edge of a small slough, the drainage from the stable running into the slough, winter and summer, and he would be surprised at his horses being sick.'

This disease is also referred to in the reports of Commissioner Perry, North-west Mounted Police, Veterinary Staff Sergeant Sweetapple, V.S., S. C. Richards, D.V.S., Grand Forks, B.C., and W. S. Bell, V.S., Cranbrook, B.C. The latter gentleman also reports another variety of it which occurred in Indian ponies on the reserve south of that place. Here it presented several complications, partaking more of the character of irregular strangles.

Typhoid fever is not the form of influenza western men are familiar with, occurring as it does almost every summer among the cow-ponies. The disease which attacks these ponies is a catarrhal form of influenza accompanied by slight coughing and nasal discharge running its course without complication in about three weeks without treatment of any kind if the weather is fine, longer should it be cold and wet.

It partakes more of the character of epizootic cellulitis or pink eye, and like it prevails most during cold wet weather, particularly when moderately warm days are followed by cold wet nights to which the horses are exposed.

It is usually ushered in by dulness, rigours, fever, infiltration by serious effusion in all submucous cellular tissues, accompanied by nervous depression and general debility, the head is carried low and the gait is tottering. The action of the bowels is sluggish and gastric and intestinal complications are apt to ensue.

During some seasons it takes the form of pink eye when the eyes are affected, being closed and watering ; the pupil is contracted and the conjunctiva is of a dark red hue, the eyelids tumid, hot and tender.

It is sometimes complicated by purpura hæmorrhagica when the legs, sheath, under surface of the belly, brisket, and head become largely swollen ; the nostrils almost closed and the mucous membrane tumid and studded by spots of a bright scarlet hue.

It is found on post mortem examination that the cellular tissue underlying all the mucous membranes is infiltrated, hence the intestines, liver, kidneys, lungs and heart may become more or less severely involved, particularly organs which have been weakened by previous disease.

Sometimes, however, with unstabled horses, if the weather is favourable, it runs a definite course, recovery taking place within a week or ten days. Pregnant mares usually have it in a mild form, but it almost invariably produces the death and abortion of the foal.

Prophylaxis.—In view of the fact of this disease being most commonly observed under circumstances favouring a miasmatic theory of origin, an effort should be made to herd them away from sloughs, particularly during hot dry weather. They should be herded on dry land and watered at a running stream or spring, if possible. Rock salt should be scattered over the grazing grounds, and on the first appearance of the disease—if it is at all practicable—they should be removed to another portion of the range ; if not, they should be given the best shelter possible, but not in a warm stable. *(Beware of sudden transitions of horses from the open ranges to warm stables.)* In addition to hay, or as a substitute for it, give them unthreshed oats. In dealing with a herd medication is not practicable, and the best you can do is to assist nature by nursing them through it the best way you can. As long as sloughs exist and the herd has free access to them, this disease will continue.

To prevent it in stabled horses, see that your stables are constructed on proper principles for insuring free ingress of pure air and thorough removal of foul air by properly constructed ventilating shafts, which should be from two to four feet square, running straight up through the roof from within two feet of the ceiling, and divided in the middle to ensure a circulation of air in them.

See that the drains are properly laid and in good order, and that no stagnant pools exist in proximity to the stable. Young and old horses should be exercised several hours in the open air every day. While its contagiousness is doubtful, it is advisable not to risk healthy animals coming in contact with diseased ones. Buckets, feeding boxes, drinking troughs, and buildings may be the media by which it is communicated.

The stables should be thoroughly lighted, sunlight is destructive to most disease germs. The walls should be frequently swept, and if possible whitewashed twice a year, and in every case immediately after it has been occupied by sick animals it should be disinfected as directed below.

TREATMENT.

All reducing measures must be interdicted, such as bleeding or purging; benefit will follow the relieving of the bowels by administering half a pint of raw linseed oil, feeding on bran mashes, oatmeal gruel, linseed tea or barley tea. Milk is highly recommended as a sustaining food in these cases.

They should be encouraged to drink cold water impregnated with nitrate of potash, three drachms daily. Two drachm doses of chloride of ammonium, or the same of hyposulphate of soda, given in a mash night and morning will tend to prevent blood clots forming.

Stimulants must be given when symptoms of weakness appear, alcohol, four to six ounces, may be given daily, well diluted, or drachm doses of the Sesqui carbonate of ammonia may be administered in a ball several times in the twenty-four hours. The swollen legs should be bandaged; swellings of the head and nostrils should be fomented with hot water. When purpura sets in ounce doses of spirits of turpentine may be given four times a day, well shaken up in a pint of linseed tea, or drachm doses of chlorate of potash may be substituted. The appetite must be coaxed by offering changes of food, green grass, carrots, &c. The animal should be clothed and protected from draughts, being subject to chills and relapses.

It must be nursed through the convalescent stage by generous diet and judicious exercise.

DISINFECTION OF STABLES.

When the buildings are modern and properly constructed as to air space, light, drainage and ventilation disinfection is a simple matter.

When, however, the stable building is old, perhaps a utilization of some old wooden structure for housing animals, or the make-shift erections of the pioneer in the west who by force of circumstances has been compelled to provide some sort of shelter which because horses are kept in it is called a stable, it is more difficult.

The disinfectant may be gaseous, spray, liquid or solid. The gases most used for disinfection are chlorine and formaldehyde.

In using gas for disinfectant purposes it is necessary to remove the animals, and close up tightly the doors, windows and ventilators.

To generate chlorine gas, place, say 8 ounces of common salt with which ½ ounce of black oxide of manganese has been mixed—in an earthenware plate, then pour three ounces of sulphuric acid over the mixture and stir, when chlorine gas will be evolved. Care must be taken not to inhale any of the fumes as they are very irritant to the bronchial tubes—several plates may be used according to the size and form of the stable. It should be left closed for four hours when it may be opened and air and light freely admitted for several hours before animals are returned to it.

Vaporized formaldehyde is extensively used for disinfecting houses, it is disengaged by a special apparatus and is introduced to a room or building by a rubber tube, passed through a key-hole.

Steam is very effective where it can be conveniently furnished.

The liquids used for disinfection are solutions of corrosive sublimate which while much used in human practice is too dangerous a poison to be employed for disinfection of stables or byres. Solutions of carbolic acid, creolin, sulpho napthol or sanitas, may be used either in watery solutions or in combination with lime wash.

Reliable disinfection may be obtained by using a spraying pump and applying a lime wash to every five gallons of which a pound of commercial carbolic acid is added, forcing it into every corner, crack or crevice of the walls, stall, divisions and floors.

The solids used are lime, chloride of lime, and carbolate of lime which are useful for sprinkling floors or mixing with composts and manure heaps.

More powerful chemicals are prescribed for disinfection, but in selecting the above we have considered efficiency, safety, cheapness and facility in procuring as most country druggists can supply them.

EXPERIMENT STATION AT OUTREMONT.

The following work was partially or entirely carried out at this station during the past year. Dr. Higgins, bacteriologist in charge was, however, transferred to the William Head quarantine, near Victoria, British Columbia, for the purpose of preparing prophylactic serum for the protection of immigrants against bubonic plague. This caused his absence for nearly nine months from the station. The work was by your orders held in abeyance till his return, and I regret that owing to the lateness of this event his report must be postponed till he has an opportunity of completing his unfinished work at this station.

TUBERCULIN EXPERIMENTS.

Producing immunity in cattle by repeated tests and retesting at three months, no reaction.

Tuberculin from Parke, Davis & Co.; United States Bureau of Animal Industry; Mr. Ross, of Guelph, Ontario, and Koch's as used by the department upon guinea pigs to confirm sterility of tuberculin and the impossibility of it producing tuberculosis.

Bacteriological examination of water from ss. *Montezuma* for typhoid bacilli.

Insertion of celloidin capsules containing living cultures of tubercle to determine relationship between germs from bovine and human sources.

Cohabitation experiments with cattle.

Studies upon etiology of multiple abscess in liver.

DUNCAN McEACHRAN,

Chief Inspector.

No. 14.

CATTLE QUARANTINE.

(A. E. Moore, D.V.S.)

Montreal, December 1, 1900.

Sir,—I have the honour to submit the following report of work done by me during the past year, from November 1, 1899, to October 31, 1900.

TUBERCULOSIS.

I beg to report that during the year I have tested for tuberculosis 869 head of cattle, 177 being in the province of Quebec, and 692 in the province of Ontario. Out of this number, 73 animals were found tuberculous, and 6 suspicious.

The diseased animals have all been killed, about one half were fit for food. Some of these were retests, where the animals were known to be tuberculous, a retest being granted to satisfy the owners. A few of these failed to react the second time, a year later, but on post mortem were found slightly affected. This corresponds with our Outremont experiments. Several others, where there was a reaction on the first test, and none on the second a year after, on post mortem there seemed to have been a healing process going on, as abscess cavities could be plainly seen, but were devoid of the usual tuberculous deposits, and there was undoubtedly cicatricial tissue present. It is on such evidence as these cases furnish that some authors attribute the curative action of tuberculin.

I held a post mortem examination on twenty-two animals in one herd after an elapse of a year from the time they were tested ; all of them were found tuberculous ; only three were rejected as being unfit for food, in them the disease being general, while in nineteen it being local, the flesh was considered quite good to be used as food, showing conclusively that the tuberculin had not aggravated the disease.

ANTHRAX.

I have dealt with three outbreaks of anthrax during the past year, nineteen animals dying with this disease. I have inoculated two herds (forty-six animals) with the Pasteur vaccine as a preventive, and it has proven satisfactory so far.

All animals dying of this disease have been properly disposed of and disinfection carried out as far as possible.

Mr. James Furze, of New Glasgow, P Q., lost eight head of cattle very suddenly, but as it was not reported until the animals were all dead and buried, I was unable to make a positive diagnosis, but suspected anthrax, and dealt with them accordingly.

BLACK LEG.

Four farmers near Maxville, Ont., had lost seven young cattle with this disease, four at one farm and one calf each at three neighbouring farms.

Two calves died near Sherbrooke, P.Q., of the same disease.

In some of these cases the carcasses were partially consumed and scattered about by crows and dogs, so that it was impossible to satisfactorily carry out necessary sanitation and disposal of the carcasses by burning or deep burial in lime.

ACTINOMYCOSIS.

Acting on instructions, I went to Prescott, Ont., to be present at the slaughtering of six steers affected with this disease belonging to Messrs. Gordon & Ironsides, which were rejected by the inspectors at Montreal for exportation, and were shipped back there.

Five were found fit for food on post mortem examination, the disease being confined to the maxillary bones. The other one had general tuberculosis, and the carcass was condemned as unfit for food.

HOG CHOLERA.

An outbreak of supposed hog cholera was reported at Oshawa, Ont. I found on examination, however, that it was not the disease, but a rheumatic condition due to local causes. I made a post mortem of one little pig and found no lesions of hog cholera.

OTHER DISEASES.

I beg to call your attention to the necessity of trying to get farmers who lose animals from disease supposed to be contagious to notify us at once, so that we be given an opportunity of making a post mortem examination to determine the actual nature of the disease. On several occasions I have been unable to make either a clinical or post mortem investigation, having to depend on the verbal reports given me, which are not always reliable or accurate.

I have the honour to be, sir,
Your obedient servant,

A. E. MOORE,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 15.

CATTLE QUARANTINE.

(M. C. Baker, D.V.S.)

Montreal, November 19, 1900.

Sir,—I beg to report that during the year ended October 31, 1900, I have inspected and passed for shipment, at the Canadian Pacific stock yards, 48,643 head of cattle and 13,240 sheep. Of these, 909 head of cattle were from the United States, the balance of the cattle and all the sheep were Canadian.

There were rejected as unfit to ship seventy-three head of cattle and six sheep; of the cattle, three were rejected for actinomycosis. The balance were lame or injured in the cars. The unusual large number rejected on account of injuries was due to the fact that a collision occurred near Montebello, in which several cars loaded with stock for export were derailed and some were overturned.

There is a noticeable diminution in the number of cases of actinomycosis, which gives reason to hope that in a short time this disease will be entirely eradicated.

A very large proportion of the cattle passing through the Canadian Pacific stock yards are from Manitoba and the North-west Territories, mostly ranch cattle, and it is gratifying to be able to report that these cattle were, on the whole, in much better condition than those of previous years.

The monthly shipments are as follows :—

	Cattle.	Sheep.
November, 1899	5,113	2,218
May, 1900	2,764	386
June	4,959	2,205
July	7,049	2,436
August	9,565	1,684
September	10,699	3,171
October	8,494	1,140
Total	48,643	13,240

The whole is respectfully submitted.

I have the honour to be sir,
Your obedient servant,

M. C. BAKER,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 16.

CATTLE QUARANTINE.

(CHAS. MCEACHRAN, D.V.S.)

MONTREAL, November 26, 1900.

SIR,—I have the honour to report that during the year commencing November 1, 1899, and ending October 31, 1900, 2,997 horses have been inspected by me, and exported from the port of Montreal to Great Britain. Forty-seven horses were held back on account of being slightly affected by a contagious and infectious disease, viz. :—Forty-three from influenza, and four from strangles.

I have the honour to be sir,
Your obedient servant,

CHAS. McEACHRAN,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 17.

CATTLE QUARANTINE.

(B. A. SUDGEN, D.V.S.)

MONTREAL, November 19, 1900.

SIR,—I have the honour to report to you the number of cattle and sheep that have been inspected and passed for shipment at the Grand Trunk Railway stock yards, Montreal, during the season extending from November 1, 1899, to October 31, 1900.

—	Cattle.		Sheep.	
	Canadian.	U. States.	Canadian	U. States.
November, 1899	1,150	......	4,380	....
May, 1900	8,098	554	521	1,407
June, "	7,322	1,792	2,056	631
July, "	6,736	853	3,624	....
August, "	5,516	682	1,596	....
September, "	2,442	439	3,934	45
October, "	2,422	638	3,297	....
Total, Canadian cattle	33,686	4,958	19,408	2,083
" U. S. "	4,958		2,083	
Total cattle	38,644		21 491	

During the season thirty-three cattle were rejected, six on account of actinomycosis, and twenty-seven owing to injuries received during transportation. Thirty-five sheep were rejected for various reasons.

Acting upon orders received from the department by Prof. Baker with regard to the outbreak of foot and mouth disease in South America, I personally attended to the cleansing and disinfection of all vessels which had during the winter of 1899-1900 been engaged in carrying live stock from South American ports to Great Britain.

As the disease also broke out in England and Wales, special attention was paid to the cleansing of vessels intending to load cattle in this port which had brought live stock from British ports to the quarantine at Lévis. In each case after the cattle spaces had been thoroughly washed down they were sprayed with a strong solution of crude carbolic acid, and if it had not been previously done, they were then whitewashed.

I have the honour to be, sir,
Your obedient servant,

B. A. SUDGEN,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 18.

REPORT ON POINT LEVIS CATTLE QUARANTINE STATION.

(J. A. Couture, D.V.S.)

Quebec, November 2, 1900.

Sir,—I have the honour to herein inclose my yearly report of the Pointe Lévis Cattle Quarantine.

There were imported during the last twelve months :

508 head of cattle, 1,063 sheep, 15 pigs, two horses.

Classified by breeds the above stock is divided as follows :—

	Cattle for Canada.	Cattle for the United States.
471 Shorthorns	406	65
19 Ayrshires	19	..
14 Cotentines	...	14
2 Kerries	2	..
1 Hereford	...	1
1 Galloway	...	1
	427	81

Being 427 head for Canada and 81 for the United States.

	Sheep for Canada.	Sheep for United States.
358 Rambouillet	306	52
343 Shropshires	333	10
100 Hampshires	52	48
83 Lincolns	79	4
65 Oxfords	34	31
45 South Downs	10	35
39 Cotswolds	39	...
20 Dorsets	10	10
10 Leicesters	10	...
Total	873	190

	Pigs for Canada.	Pigs for United States.
15 Yorkshires	13	2

16 calves were born in quarantine ; 2 calves, 1 cow, 2 sheep died in quarantine ; 31 head of cattle were tested with tuberculine, 12 of which reacted.

I have the honour to be, sir,
Your obedient servant,

J. A. COUTURE, D.V.S.,
Assistant Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

POINT LEVIS CATTLE QUARANTINE, OCTOBER 31, 1900.

STATEMENT of Swine Imported at Lévis Quarantine, 12 months ended October 31, 1900.

July 22	S. S. Etolia	12 Yorkshire, Jos. Fetherstone, Streetsville, Ont.	Discharged Aug. 11	15
Aug. 2	" Lycia	1 " " " "	" " 11	
" 10	" Tritonia	2 " N. P. Clark, St. Cloud Minn., U.S.	" Oct. 29	

J. A. COUTURE, D.V.S.
Assistant Inspector.

STATEMENT of Sheep Imported at the Lévis Cattle

Date of Arrival.	Steamer.	Line.	From.	Rambouillets.			Shropshires.			Hampshires.			Lincoln.			Oxfords.		
				Ram.	Ewe.	Total.	Ram.	Ewe.	Total.	Ram.	Ewe.	Total.	Ram.	Ewe.	Total.	Ram.	Ewe.	Total.
1899.																		
Nov. 11..	Monteagle......	El. Dempster.	Bristol..				2	41	43									
" 11..	"	"	"					10	10									
" 11..	"	"	"															
" 23..	Andoni.........	"	London...								20	20						
" 23..	"	"	"										39	..	39			
1900.																		
May 16..	Westphalia......	Americ'n Ham	Hamburg.	31	187	218												
" 16..	"	"	"	11	59	70												
" 17..	Lakonia........	Donaldson ...	Glasgow..													2	6	8
July 5..	Westphalia.....	Americ'n Ham	Hamburg.	9	9	18												
" 9..	Arnage.........	El. Dempster.	London ..				12	38	40							2	..	2
" 19..	Degama.........	"	Bristol ...															
" 19..	"	"	"													4	10	14
" 19..	"	"	"				1		1	2	..	2	1	2	3	19	12	31
" 22..	Etolia..........	"	"							5	2	7	1	..	1			
" 26..	Lakonia........	Donaldson....	Glasgow..				46	77	123	7	25	32	2	15	17	4	6	10
" 30..	Montford	El. Dempster.	Liverpool.										9	14	23			
Aug. 2..	Lycia...........	"	Bristol .				16	90	106									
" 14..	Memnon........	"	"				20		20	10	..	10						
" 14..	"	"	"															
" 14..	"	"	"															
" 14..	"	"	"															
" 14..	"	"	"															
" 14..	"	"	"								2	2						
" 14..	"	"	"															
Sept. 4..	Teutonia	Am. Ham....	Hamburg.	32	..	32												
" 4..	"	"	"	19	1	20												
" 6..	Montevidio.....	Allan.........	London...							1	20	21						
Oct. 13..	Lake Champlain	El. Dempster.	Liverpool.							6	..	6						
				102	256	358	97	256	343	31	69	100	52	31	83	31	34	65

Quarantine, Twelve Months ended October 31, 1900.

Southdown.			Cotswold.			Dorset.			Leicester.			Grand Total.	Owner.	Address.	Date of Sailing.	Date of Discharge.
Ram.	Ewe.	Total.	Ram.	Ewe.	Total.	Ram.	Ewe.	Total.	Ram.	Ewe.	Total.					
															1899	1899
												43	W. S. Hawkshaw	Glenworth, Ont.	Oct. 30	Nov. 27
												10	Geo. Allen	Allerton, Ills.	″ 30	″ 27
												10	A. W. Smith	Maple Lodge, Ont.	″ 30	″ 27
									4	6	10	20	Hon. W. H. Cochran	Hillhurst, Que.	″ 31	Dec. 7
												39	J. Patrick	Ilderton, Ont.	″ 31	″ 7
															1900	1900
												218	Robt. Miller	Stouffville, Ont.	Apl 28	May 30
												70	W. S. Hawkshaw	Glenworth, Ont.	″ 28	″ 30
												8	H. Cargill & Son	Cargill, Ont.	May 5	″ 30
												18	Robt. Miller	Stouffville, Ont.	June 19	July 19
			1	2	3							45	John Campbell	Woodville, Ont.	″ 24	″ 23
1	3	4										4	T. C. Douglas	Galt, Ont.	July 4	Aug. 6
												14	H. Arkell	Arkell, Ont.	″ 4	″ 6
5	6	11				3	7	10				58	Geo. McKerrow	Sussex, Wis.	″ 4	″ 6
												8	Wm. Newton	Pontiac, Mich	″ 11	″ 6
			17	19	36	1	3	4				222	Robt. Miller	Stouffville, Ont.	″ 14	″ 8
												23	J. H. Patrick	Ilderton, Ont.	″ 23	″ 13
												106	W. C. Edwards & Co.	Rockland, Ont.	″ 19	″ 15
												30	John Sparks	Reno, Nevada	″ 29	″ 28
2		2										2	Hon. G. A. Drummond	Beaconsfield, P.Q.	″ 29	″ 28
2	2	4										4	Geo. Allan	Allerton, Ill.	″ 29	″ 28
							3	3				3	G. McGillvery	Uxbridge, Ont.	″ 29	″ 28
							3	3				3	R. H. Harding	Thorndale, Ont.	″ 29	″ 28
												2	P. W. Artz	New Carlisle, Ohio	″ 29	″ 28
1	2	3										3	Abram Renick	Seymore, Ky.	″ 29	″ 28
												32	Geo. Harding & Son	Waukshaw, Wis.	Aug. 20	Sept. 19
												20	D. Lincoln	Milford Centre, Ohio	″ 20	″ 19
1	20	21										42	Dr. Webb	Shelburn, Vt.	″ 24	″ 20
												6	J. G. Massey	Fort Logan, Col.	Oct. 4	Oct. 30
12	33	45	18	21	39	4	16	20	4	6	10	1,063				

STATEMENT of Cattle Imported at the Lévis Cattle Quarantine,

Date of Arrival.	Steamer.	Line.	From.	Shorthorn.				Ayrshire.				Contentine.				Dexter Kerry.				Hereford.			
				Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.
1899.																							
Nov. 2.	Kastolia....	Donaldson...	Glasgow	..		6	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 2.	" ...	"	"	..	17	9	26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 2.	"	"	"	..	12	4	16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1900.																							
May 16.	Lakonia....	"	"	5	46	1	52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 16.	"	"	"	7	2	1	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 17.	Pomeranian	Allan......	"	..	..	..	..	2	14	3	19	..	..	..	..	..	..	..	..	..	..	..	..
" 31.	Tritonia....	Donaldson....	"	6	45	17	68	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
July 26.	Lakonia....	"	"	3	40	13	56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 26.	" ...	"	"	1	34	6	41	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 31.	Mont Blanc.	Franco-Can...	Havre..	..	..	..	..	..	..	..	..	..	2	12	14	..	..	..	..	..	..	..	..
Aug. 3.	Amarynthia	Donaldson....	Glasgow	1	12	5	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 3.	"	"	"	3	8	1	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 10.	Tritonia....	"	"	3	18	6	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 10.	" ...	"	"	..	18	6	24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 10.	" ...	"	"	5	18	6	29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 14.	Memnon....	El. Dempster.	Bristol..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1
" 14.	" ...	"	"	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..
Sept. 6.	Amarynthia	Donaldson....	Glasgow	..	19	..	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 6.	" .	" ...	"	..	5	3	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 6.	" .	" ...	"	1	...	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 14.	Tritonia....	" ...	"	..	7	9	16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Oct. 10.	Etolia	El. Dempster.	Bristol	..	5	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 20.	Tritonia....	Donaldson....	Glasgow	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 20.	" ...	" ...	"	2	1	1	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 20.	" ...	"	"	..	6	.	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
" 20.	" ...	"	"	..	17	6	23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
				37	352	82	471	2	14	3	19	..	2	12	14	..	2	..	2	1	..	..	1

Born in quarantine...

Grand total.......

twelve months ended October 31, 1900.

Galloway. Bulls.	Cows.	Calves.	Total.	Grand Total.	Owner.	Address.	Date of Sailing.	Date of Discharge.	Born in Quarantine.	Died in Quarantine.
							1899	1900.		
..	..	..	..	6	John Mills & Son....	Brougham, Ont.....	Oct. 20..	Jan. 17..	....	
..	..	..	..	26	H. Cargill & Son.....	Cargill, Ont..... ..	″ 20..	″ 17..	....	
..	..	..	..	16	W. C. Edwards......	Rockland, Ont......	″ 20..	″ 17..	3	
							1900.			
..	..	..	..	52	H. Cargill & Son.....	Cargill, Ont....	May 5..	Aug. 1..	....	
..	..	..	..	10	Robert Miller.......	Stouffville, Ont.	″ 5..	″ 1..	....	
..	..	..	..	19	W. W. O'Gilvie......	Lachine, Que........	″ 5..	″ 1..	....	
..	..	..	..	68	W. G. Pettit...	Freeman, Ont	″ 18..	″ 15..	1	
..	..	..	..	56	Robt. Miller.	Stouffville, Ont.. ...	July 14..	Oct. 12..	5	1 calf.
..	..	..	..	41	John Isaac....	Markham, Ont......	″ 14..	″ 12..	1	2 cows & c.
..	..	..	..	14	H. R. C. Watson	Brandon, Vt........	June 18..	Sept. 20..	1	
..	..	..	..	18	N. A. Lind..	Rolfe, Iowa.........	July 21..	Oct. 20..	1	
..	..	..	..	12	M. E. Jones.	Willimsville, Ills....	″ 21..	″ 20..	1	1 calf.
..	..	..	..	27	Art. Johnson........	Greenwood, Ont	″ 28..	″ 26..	1	
..	..	..	..	24	W. C. Edwards..	Rockland, Ont......	″ 28..	″ 26..	1	
1	..	..	1	30	N. P. Clark...... ...	St Cloud, Minn.....	″ 28..	″ 26..	... .	
..	..	..	..	1	John Sparks.........	Reno, Nevada	″ 29..	″ 30..	....	
..	..	..	..	2	Hon. G. Drummond..	Beaconsfield, Que...	″ 29..	″ 30..	....	
..	..	..	..	19	H. Gargill & Son	Cargill, Ont........	Aug. 25..	....	1	
..	..	..	..	8	S. Nichl.............	Sylvian, Ont...... .	″ 25..	....	....	
..	..	..	..	2	Art. Johnston.	Greenwood, Ont	″ 25..	....	....	
..	..	..	..	16	Wm. Linton.........	Aurora :	Sept. 1 .	....	....	
..	..	..	..	5	W. R. Nelson........	Kansas City, Ind....	″ 27..	....	....	
..	..	..	..	3	H. Cargill & Son.....	Cargill, Ont....	Oct. 6..	....	....	
..	..	..	..	4	Thos. Russell........	Exeter, Ont.......	″ 6..	... ...	......	
..	..	..	..	6	Chas. Rankin........	Wyebrige, Ont . ..	″ 6..	....	....	
..	..	..	..	23	Geo. Isaac...... .. .	Cobourg, Ont.......	″ 6..	....	....	
1	..	..	1	508					16	4
....				16						
....				524						

J. A. COUTURE, D.V.S.,
Assistant Inspector.

No. 19.

REPORT ON ST. JOHN CATTLE QUARANTINE STATION.

(J. H. Frink, D.V.S.)

St. John, N.B., November 1, 1900.

Sir,—I have the honour to submit my annual report concerning the work done at this station during the year.

Imports.—A large number of cattle, sheep, swine and horses have been imported through this port from Great Britain, careful inspection having been made on shipboard, before permission was given to land, on account of the prevalence of foot and mouth disease in certain districts of Great Britain. The usual term of quarantine was enforced, ninety days on cattle and fifteen days for sheep and swine. Horses, on examination, having been found healthy, and accompanied with the necessary health certificates, were allowed to proceed. No contagious disease manifested itself in any of the animals imported. It will be absolutely necessary to extend the facilities now existing for the purpose of quarantine, so that in the event of contagious disease breaking out in quarantine, it could be effectually controlled.

Exports.—The export of cattle and sheep to Great Britain nearly doubled the past year. Very few animals were condemned. The practice of sending cattle for export affected with actinomycosis has been discontinued, and very few animals have been injured in transit. The cattle yards are kept and maintained in a wretched condition, notwithstanding repeated protests made to the railway authorities, and I believe that more injury and loss is inflicted at these places, in a single large shipment, than would place the yards in a fairly decent state of repair. Bad treatment before being placed on shipboard, together with the consequences of a sea voyage, inevitably tend to a depreciation in value to the shipper, and the reputation of the producer must also suffer.

Tuberculosis.—The testing of cattle for tubercle has not been prosecuted with as much vigour as in previous years, owing, in some measure, to the relaxation of local laws governing the sale of milk. The total number tested was 167. Six animals were found diseased. As a result of observation there appears to be a better feeling towards the tuberculine test among the breeders of pure-bred stock, and those who have herds entirely free show much reluctance in allowing an untried animal to mix with their own, and if this feeling is maintained, there can be little doubt that the expression pure bred and tuberculous will cease to be applied and lose its significance.

Anthrax.—Two outbreaks of anthrax were observed during the year, one in King's County, affecting not only cattle but swine. The cause in one case was traced directly to water drawn from a well, which had not been used for some years. The usual source of supply, a running stream, had been suddenly and firmly frozen over. In each case the bacillus anthrax was stained and identified microscopically. The carcasses were destroyed and the premises disinfected.

Other Inspections.—An inspection was made of the ss. *Fashoda*, chartered to carry hay and fodder to South Africa for war purposes, this vessel having carried on the previous voyage cattle from the Argentine Republic, then an infected country. The vessel having been stripped of all wood-work, stanchions, stalls and fittings on the other side, and disinfected off the coast of Great Britain, together with the fact that no cattle were loaded below decks, loading was proceeded with.

I have the honour to be sir,
Your obedient servant,

JAMES H. FRINK,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

CATTLE, HORSES AND SHEEP EXPORTED FROM ST. JOHN, N.B., WINTER 1899-1900.

Canadian Cattle.	Canadian Sheep.	U. S. Cattle.	U.S. Horses.	Canadian Horses.	Geldings.	Mares.	Carriage.	Draft.	Sheep Condemned.	Cattle Condemned.	Total
12,255	2,911	3,216	72	413	315	98	166	247	3	*	19,693

Three head of cattle were condemned for injuries received in transit; one animal with actinomycosis, one horse detained with strangles, and three sheep condemned with 'scab.'

IMPORTS—HORSES FROM GREAT BRITAIN.

Name of Importer.	Address.	Steamship.	From.	Breed.	Stallions.	Total.
Joseph Watson........	Lincoln, Neb...	Monterey....	Liverpool..	Shires....	12	19
Dalgetty & Co........	London, Ont....	Amarynthia...	Glasgow....	Clydesdale..	2	
James Moffat.........	Teeswater, Ont..	" ..	"	" ..	5	

IMPORTS—BREEDING CATTLE FROM UNITED STATES.

Name.	Address.	Via.	Breed.	Cattle.	Sheep.	Total.
W. McMonagle......	Sussex Vale, N.B.	Intern. St'hip.	Guernsey...	2	....	3
D. Killen............	Petitcodiac, N.B.	C.P.R..	Leicester....	....	1	

CATTLE TESTED FOR TUBERCULOSIS DURING YEAR.

Number of Cattle Tested.	Re-acted.	Diseased on Post Mortem.	Class.	Females.	Males.
167	6	6	Grade Ayrshires & Jerseys	5	1

PORT OF ST. JOHN.

Total Number Imported from November 1, 1899, to November 1, 1900.

Date of Arrival.	Steamer.	Line.	Sailing From	Cattle.					Sheep.			
				Bulls.	Cows and Heifers.	Calves	Total.	Breed.	Rams.	Ewes.	Total.	Breed.
1899.												
November 19...	S.S. Alcedes...	Donaldson	Glasgow....	4	14	......	18	Shorthorns..........	.. .	.....	...	....
1900.												
March 3.......	SS. Amarynthia.....	Donaldson........	Glasgow....	1	16	2	19	Ayrshires..	.. .	....	....	....
" 14...... ..	SS. Lake Huron.....	Elder Dempster...	Liverpool ..	... .	....	......	.....	... .	.....	36	36	Suffolk Down &Shrops
" 17........	SS. Concordia.......	Donaldson..	Glasgow...	6	42	6	54	Shorthorns....	.....	......	....	....
" 29	SS. Lake Superior..	Elder Dempster...	Liverpool...	15	2	......	17	Galloways&Hereford	. .	..	.....	... .
" 29	" " ..	" " ..	" ...	2	1	...	3	Sussex.	....	....	.....	....
April 22..	SS. Lake Huron.....	" " ..	" ...	2	....	. ..	2	Galloway.	.. ..	......	. ...	.. . .
July 3..	SS. Ocamo.	Pickford & Black.	Glasgow...	1	1	......	2	Polled Angus... .	....	... ..	....	. . ..

Swine. Boars	Swine. Sows.	Swine. Total.	Swine. Breed.	Grand Total.	Names of Owners.	Residence.	Date of Sailing.	Discharged.	Born in Quarantine.	Dead in Quarantine.	Name of Disease.
......	......	......	....	18	W. H. Cochrane......	Hillhurst, P. Q.....	Nov. 4....	Feb. 3....	......	....	* Diseases incidental to parturition, aggravated by sea voyage.
......	......	......	....	19	Robert Reford..........	Montreal, P. Q......	Feb. 10....	May 11...	5	......	
......	......	......	....	36	Thomas Bradshaw.......	Danville, P. Q......	March 2....	Mar. 29....	*9	*8	
9	......	......	Improved York...	63	W. D. Flatt.....	Hamilton, Ontario..	" 3....	May 30....	2	†2	†Diarrhœa.
......	......	......	....	17	D. H. Andrews.........	Crane Lake, N.W.T.	" 17....	June 21....	....	....	
......	......	......	....	3	A. L. D'Enycourt.......	Calgary, N.W.T....	" 17....	" 21....	....	....	
......	......	......	....	2	Little Bow Riv'r Cat'le Co	High River, Alberta	April 8....	July 20....	....	....	
......	......	......	....	2	W. H. Stairs.	Hillaton, N. S ...	June 22....	Sept. 28 ...	....	....	
				162							

No. 20.

REPORT ON HALIFAX, N.S., CATTLE QUARANTINE STATION,

(WM. JAKEMAN, D.V.S.)

HALIFAX, October 31, 1900.

SIR,—I beg leave to submit my annual report on cattle quarantine at the port of Halifax, from November 31, 1899, to October 31, 1900.

On November 17, 1899, I received a letter from the Secretary of the Department of Agriculture, advising me to go to George White, Esq., of Grafton, King's County, and apply the tuberculin test on his cattle, which I did on the 28th, with results as per charts sent to the department.

On November 18, 1899, I received a letter from the Secretary of the Department of Agriculture, requesting me to apply the tuberculin test to the cattle of the Mount Hope Asylum, which was done, with results as per chart sent to the department.

On September 5, 1900, I received a letter from the secretary of the Department of Agriculture, requesting me to apply the tuberculin test to the cattle of J. R. Starr, Esq., King's County ; Graham Creighton, Esq., Halifax ; J. J. McDougall, Esq., Glace Bay, C.B.; P. J. Petrie, Esq., Glace Bay, C.B.; Hiram Donkin, Esq., Glace Bay, C.B. Also, the cattle of Dr. R. A. H. MacKeen, Glace Bay, C.B.; D. Burchell, Esq., Glace Bay, C.B.; J. R. Blackett, Esq., Glace Bay, C.B.; P. Farrell, Esq., Glace Bay, C.B., which I did, with results as per chart sent to the department.

EXPORTED.

November 2, 1889.—Per ss. *Duart Castle,* of P. & B. Line, to West Indies, 25 sheep and 1 pig.

November 9, 1899.—Per ss. *Pro Patria,* one horse to Newfoundland.

November 15, 1899.—Per ss. *Beta,* of P. & B. Line, to West Indies : three cattle, two horses.

November 30, 1899.—Per ss. *Taymouth Castle,* of P. & B. Line, to Bermuda : ten cattle, ninety-eight sheep, eleven horses.

December 15, 1899.—Per ss. *Beta,* of P. & B. Line, to West Indies : two cows.

January 15, 1900.—Per ss. *Pro Patria,* French line to St. Pierre, Newfoundland : two cows.

February 23, 1900.—Per ss. *Duart Castle,* of P. & B. Line, to Bermuda : sixty-one sheep.

March 27, 1900.—Per ss. *Scotsman*; the property of Leinster Regiment, for England : four horses.

March 29, 1900.—Per ss. *Pro Patria,* French line to St. Pierre, Newfoundland : ten cows, two sheep.

April 30, 1900.—Per ss. *Pro Patria,* French line to St. Pierre, Newfoundland : one horse.

May 15, 1900.—Per ss. *Beta,* of P. & B. Line, to Bermuda : three cows.

May 28, 1900.—Per ss. *Pro Patria,* French line to St. Pierre, Newfoundland : one horse.

June 21, 1900.—Per ss. *Scotsman,* to England : two horses, two dogs, the property of General Lord Seymour, Leinster Regiment.

July 14, 1900.—Per ss. *Beta,* of P. & B. Line, to Jamaica : three cows, fifty-five sheep, five horses.

August 11, 1900.—Per ss. *Orinoco,* of P. & B. Line, to West Indies : fifty sheep.

August 15, 1900.—Per ss. *Taymouth Castle,* of P. & B. Line, to West Indies : six sheep, three pigs.

September 10, 1900.—Per ss. *Ocaino,* of P. & B. Line, to West Indies : two cows, thirty-five sheep, two horses.

September 15, 1900.—Per ss. *Beta,* of P. & B. Line, to Jamaica : seven sheep.

October 8, 1900.—Per ss. *Orinoco,* of P. & B. Line, to Jamaica : two horses, four cows, eighty-five sheep, one pig.

October 15, 1900.—Per ss. *Beta,* of P. & B. Line, to Bermuda : seven horses, fifteen sheep, six cows, four calves.

I have the honour to be sir,
Your obedient servant,

W. JAKEMAN,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 21.

REPORT ON HEALTH OF LIVE STOCK IN ONTARIO.

(Andrew Smith, F.R.C.V.S.)

Toronto, October 31, 1900.

Sir,—I have the honour to submit the following report on the health of the domestic animals in the province of Ontario during the past year.

HORSES.

The general health good and a marked increase in their general value. Strangles and influenza existed to a certain extent more particularly among horses in cities. Two outbreaks of glanders were reported, one by Mr. F. Bryant, veterinary inspector, Sunderland, where five horses were destroyed, and another by Mr. S. E. Boulter, veterinary inspector, Niagara Falls, South. Both cases have been already reported to the department.

CATTLE.

Throughout the province cattle have been generally healthy. Of the fat cattle passing through the market, in the city of Toronto during the past year that were held as suspicious, and butchered under veterinary inspection, only a few cases have been condemned as tuberculous, these cattle are(as a rule, young, fat and vigorous.

SHEEP.

A severe outbreak of sheep-scab occurred at Mr. Bentley's farm in Whitchurch. These sheep came from Wyoming, United States. I do not think the disease spread from the farm. This outbreak was reported to the department in March.

A number of cases were reported in the district of Woodville. Mr. Gerrow, veterinary inspector, reports the disease is now under control.

SWINE.

No cases of hog cholera have been reported in this district.

I have the honour to be, sir,
Your obedient servant,

ANDREW SMITH, F.R.C.V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 22.

REPORT ON POINT EDWARD CATTLE QUARANTINE STATION.

(ARTHUR BROWN, D.V.S.)

SARNIA, October 31, 1900.

SIR,—I have the honour to submit my report of cattle and swine received into the Ontario cattle quarantine at Point Edward (from November 1, 1899, to October 31, 1900. The swine imported were of good quality, a preference being shown for white Chesters.

There has been no diseased animals in the quarantine this year, and I may state that no contagious disease exists in this district, with the exception of some cases of tuberculosis and actinomycosis.

Attached you will find a detailed statement of the animals received into quarantine, also cattle that were imported for breeding purposes that did not require to be placed in quarantine during this period.

I have the honour to be, sir,
Your obedient servant,

ARTHUR BROWN, V.S.,
Inspector.

STATEMENT of Cattle received into the Ontario Cattle Quarantine at Point Edward from November 1, 1899, until October 31, 1900, also cattle that were imported for breeding purposes, having the necessary tuberculin test and health certificates, also cattle forming part of the settler's effects.

Date of Entry.	Durhams.		Holsteins.		Galloways.		Jerseys.		Common Bred.		Valuation.	Removal.	Consignee and Address.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
1899.											$ cts.	1899.	
December 6...	......	......	......	......	......	......	......	1	......	......	50 00	December 13..	Geo. Primmer, Petrolea, Ont.
" 15...	......	......	......	......	1	2	......	......	......	......	700 00	" 15..	D. McCrae, Guelph, Ont.
1900.												1900.	
January 19....	1	1	......	......	......	......	......	......	......	...	1,000 00	January 19....	F. D. Flatt, Hamilton, Ont.
" 24....	......	......	1	......	......	......	......	......	......	......	50 00	February 1 ...	H. Bollert, Stratford, Ont.
March 15	......	......	......	......	......	......	......	......	......	5	125 00	March 15.....	Thos. Brush, Warwick, Ont.
April 9.......	......	......	......	......	......	......	......	......	......	2	60 00	April 9......	D. Ickler, Wiarton, Ont.
June 5......	......	......	......	......	......	......	......	......	......	1	35 00	June 5 . .	Peter Laird, Port Arthur, Ont.
August 10....	2	5	......	......	......	......	......	......	......	......	1,000 00	August 10....	W. D. Flatt, Hamilton, Ont.
" 21....	2	......	......	......	......	......	......	......	......	......	300 00	" 21....	Robt. Miller, Stouffville, Ont.
October 16....	......	......	......	......	......	......	......	......	......	4	120 00	....	A. P. Wilcocks, Arkona, Ont.
Total..	5	6	1	......	1	2	......	1	......	12	3,440 00		

Total number of cattle, 28.

REPORT of Swine received into the Ontario Cattle Quarantine at Point Edward from November 1, 1899, until October 31, 1900.

Date of Entry.	White Chesters.	White Chesters.	Poland China.	Poland China.	Berkshire.	Berkshire.	Essex.	Essex.	Date of Removal.	Value.	Consignee and Address.
1899.	M.	F.	M.	F.	M.	F.	M.	F.	1899.	$ cts.	
Nov. 10..	....	....	....	..	....	....	1	....	Nov. 25..	15 00	Mrs. J. T. Maynard, Mission, B.C.
" 10..	....	....	1	....	....	....	....	....	" 25..	30 00	Meredith & Dunlop, Thorncliffe, O.
" 16..	....	....	....	1	..	...	...	....	Dec. 1..	10 00	" Dresden, Ont.
Dec. 8..	1	1	....	....	....	....	....	...	" 22..	35 00	Jno. B. Stevenson, St. Thomas, Ont.
1900.											
June 6..	....	....	....	....	1	....	. ..	....	June 21..	25 00	W. A. Shields, Milton, Ont.
" 28..	1	1	....	...	....	....	....	....	July 13..	40 00	G. H. Callbeck, Summerside, P.E.I.
July 11..	1	1	....	....	....	....	....	....	" 26..	40 00	J. D. Deeks, North Williamsb'g, O.
" 18..	1	1	....	...	....	....	....	....	Aug. 2..	40 00	Anson McCabe. Mt. Wolfe, Ont.
Aug. 1..	1	1	....	....	....	....	....	....	" 16..	40 00	Rich. Hamon, Aurora, Ont.
" 15..	1	....	....	....	....	....	....	...	" 30..	25 00	Joe James, Orillia, Ont.
" 29..	1	....	....	....	....	....	....	....	Sept. 13..	25 00	Jos. Henshaw, London, Ont.
Sept. 19..	....	....	....	....	1	....	....	....	Oct. 4..	40 00	H. Bennett & Son, St. Williams, Ont.
April 6..	....	....	.	...	...	1	....	....	April 6..	20 00	M. B. Hill, Stouffville, Ont. (settler).
Total.	7	5	1	1	2	1	1	....		385 00	

Total, 18.

I examined seventy-six horses and twenty-two sheep and found them free from any infectious or contagious diseases.

ARTHUR BROWN, V.S.,
Inspector.

No. 23.

REPORT ON HOG CHOLERA OR SWINE PLAGUE IN SOUTH ESSEX. ONT.

(M. B. PERDUE, V.S)

KINGSVILLE, November 16, 1900.

SIR,—I beg to report that during the year ended October 31, 1900, my duties in South Essex have been chiefly confined to the inspection of localities infected with swine plague.

The following is a statement by months of hogs slaughtered for this cause :—

Date.	Owner.	Diseased Hogs.	Contact Hogs.	Amount of Indemnity.
1899-1900.				$ cts.
November 9	G. M. Thornton	6	14	82 00
February 17	Levi Mitchell	3	6	26 50
" 24	Hermand Bertrand	26	5	81 08
March 9	D. C. Decare	19	11	113 75
May 26	Albert Burns	4	2	17 00
June 4	Amon Noble	2	9	47 08
" 9	Albini Lucier	8	5	76 92
September 11	Chas. Renaud	7	5	81 00
" 11	Ephriam Renaud	10	34	227 17
" 15	David Kennedy	6	15	84 58
" 24	Dr. McBride	20	22	216 33
" 24	Jno. Gibb	32	20	231 25
" 24	Jas. Lafferty	24	22	190 82
" 28	Fred. Mickle	7	13	94 67
" 28	Curtis Mickle	10	20	191 00
October 8	Augustus St. Onge	5	17	71 67
" 8	Antoine Beaudoin	8	14	94 42
" 11	Jno. P. Deneau	4	4	16 25
" 11	Jas. Shay	2	0	4 00
" 15	Chas. Sawyer	4	10	29 17
" 15	Thos. Goodchild	10	19	81 50
" 15	Francis Goodchild	2	26	136 50
" 24	J. H. Beaudoin	6	1	29 25
" 30	J. S. Patton	10	27	173 33
" 30	Jno. Park	9	26	209 17
" 30	Levi Wright	9	16	93 42
	Total outbreaks, 26	253	363	2,699 83

In addition to the above cases, I have inspected a large number of farms where the disease was suspected to exist by the owner or others, a number of these were quarantined for a short time on suspicion.

In every case where swine plague existed all hogs diseased and in contact were slaughtered at once, and the premises quarantined and directions given for disinfection.

I would call your attention to the fact that the recent severe outbreak has been confined to a line of farms fronting on the Detroit River, owned by some of the most extensive hog raisers in western Ontario.

The premises in most cases were dry and clean, and the hogs well housed and cared for. A number of the hogs slaughtered were very valuable, having registered pedigrees.

In Wayne County, and in many of the townships across the river in Michigan swine plague has been prevalent and recently has been very severe. At this part of the river the current sets in towards the Canadian shore, and as there is always considerable offal washed up, that has been thrown into the river from either side, it is quite probable that the infection came from this source.

Beginning at Messrs. Ephriam and Chas. Renaud, in Malden township, the disease next appeared on the adjoining farm to the south, and then followed the river front in a direction opposite to the current, taking in nineteen farms, in a distance of four or five miles. On many of the farms the hogs had access to the river bank, and on no other farms except those having river front did the disease appear.

The present regulations with regard to quarantine and disinfection when faithfully carried out have proved very effective.

For over three years I have not found a single instance where a second outbreak has taken place on disinfected premises after the quarantine had been removed, although in almost every case the farmers have again taken up the raising of hogs.

In each yearly report there is a steadily increasing proportion of contact hogs slaughtered as compared with diseased hogs. This is owing to the fact that the farmers are learning that it is to their own interest to report the cases on the first appearance of the disease. This is an advantage both ways. The owner receives a three-fourths valuation on a majority of his hogs for which he would have only realized one-third value had he delayed and allowed them to become infected, and it enables me to deal with the attack early and prevent it spreading to other parts of my district.

Of actinomycosis there were three cases among cattle.

I have the honour to be, sir,
Your obedient servant,

M. B. PERDUE, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 24.

REPORT ON HOG CHOLERA OR SWINE PLAGUE IN THE COUNTY OF KENT, ONT.

(Jos. Kime, Jr., V.S.)

Chatham, October 31, 1900.

Sir,—I beg to submit my annual report in connection with contagious diseases in animals in the vicinity of the city of Chatham, county of Kent.

1899.

November 1.—Visited farm and premises of R. Cummings, township of Chatham, and slaughtered hogs for swine plague.

November 2.—Visited premises of R. Cummings to inspect fat hogs as slaughtered.

November 7.—Visited farm of Wm. Nollies, township of Chatham, and slaughtered hogs for swine plague ; sixteen diseased and four in contact.

November 15.—Visited farm of John Vincents to inspect and slaughter nine diseased hogs and fifteen in contact.

November 20.—Visited farm and premises of Alex. Kennedy, Dover township, and slaughtered hogs for swine plague.

November 21.—Visited Alex. Kennedy's, and inspected fat hogs as slaughtered.

November 23.—Visited the farm of W. J. Wilcox and Russel Pharell, Chatham township, as to cleansing and disinfecting of premises, removal of quarantine, &c.

November 28.—Visit to inspect hogs as to disease on farm of Frank Stocks, Dover township. Disease not contagious.

November 30.—Visit to inspect farms of Samuel Timmerman, William Johnson, Robert Cummings and J. Vincent as to cleansing and disinfecting, removal of quarantine, &c.

December 6.—Visited farm and premises of T. S. Purdy, inspected hogs and slaughtered twenty diseased and fifteen in contact.

December 12.—Visited R. A. Cummings and J. Vincents to remove quarantine.

December 15.—Visited William Noltus and Geo. Green, as to cleansing and disinfecting of premises, removal of quarantine, &c.

December 19.—Visit to remove quarantine off farm of Alex. Kennedy, Dover township.

December 20.—Visit to inspect and slaughter hogs on farm of J. R. Longmore, of the township of Raleigh.

December 22.—Visit to inspect and quarantine hogs on the premises of Thomas Montgomery, Raleigh township.

December 26.—Visit to slaughter hogs for swine plague on the farm of Thomas Montgomery; also, quarantined hogs and farm of William Montgomery, Raleigh township.

December 29.—Visit to inspect hogs on premises of Matthew Dillon, Raleigh township. Hogs free from disease.

1900.

January 6.—Visit to inspect hogs on premises of Stephen Keiver and Geo. Duff's slaughter house, Harwich township.

January 8.—Visit to slaughtered hogs on farms of Geo. Duff and S. Keiver.

January 9.—Visit to slaughter hogs on farm and premises of S. Fisher, Harwich township, for swine plague; quarantined farm, &c.

January 15.—Visited and inspected farm and premises of Thomas S. Purdy, of Tilbury East township, as to cleansing and disinfecting; removal of quarantine, &c.

January 26.—Visit to farms of J. R. Longmore and Thomas Montgomery, as to cleansing and disinfecting.

March 2.—Visit to inspect and slaughter hogs for swine plague on farm and premises of R. J. Parks, township of Chatham.

March 7.—Visit to inspect and slaughter hogs on premises of John Solomon, township of Chatham.

March 12.—Visit to inspect hogs on premises of H. Morgan, township of Chatham. Disease not contagious.

March 29.—Visit to remove quarantine from premises of A. Evans and Samuel Fisher, Horwich township.

May 2.—Visit to remove quarantine from the premises of Stephen Keiver, township of Horwich.

May 7.—Visit to inspect the farm and premises of John Solomon, as to removal of quarantine.

May 9.—Visit to J. R. Longmore, to remove quarantine off farm.

May 11.—Visit to R. J. Parks, to remove quarantine.

May 23.—Visit to inspect hogs on the premises of Matthew Stuart, lot 1, con. 9, township of Chatham, and slaughter for swine plague.

May 29.—Visit to inspect hogs on the farm and premises of Thomas Brady, Raleigh township, and found disease not contagious.

July 9.—Visit to inspect the farm and premises of Thomas and Wiliam Montgomery, Raleigh township, as to cleansing and disinfecting of premises, removal of quarantine, &c.

July 10.—Visit to inspect farm and premises of Matthew Stuart, of Chatham township, as to release of farm from quarantine.

July 11.—Visited farm and premises of Peter Askile, lot 19, con. 9, township of Orford, and found disease not contagious.

July 27.—Visit to quarantine farm of Manson Campbell, of the township of Harwich.

July 30.—Visit to remove quarantine from premises of Geo. Duff, township of Horwich.

July 31.—Visit to slaughter hogs on the premises of Manson Campbell, Harwich township, for swine plague.

October 22.—Visit to inspect premises of M. Campbell, Harwich township, as to cleansing and disinfecting premises, removal of quarantine, &c.

Comparing this report with my report of 1899 shows that by the present system of dealing with hog cholera and swine plague, it can be completely stampel out, which has been done in this district.

I have the honour to be, sir,
Your obedient servant,

JOSEPH KIME, Jr.,
V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 25.

REPORT ON HOG CHOLERA OR SWINE PLAGUE IN THE COUNTY OF BOTHWELL, ONT.

(J. R. Thorne, V.S.)

Wallaceburg, Ont., October 31, 1900.

Sir,—I have the honour to submit to you my annual report for the year ended October 31, 1900.

I have the pleasure to inform you that the health of stock in this district has been good during the past year ; no contagious disease having existed in this district with the exception of tuberculosis, actinomycosis and a few cases of anthrax.

In January last I visited the farm of Mr. Frank Danials, in the township of Zone, and tested for tuberculosis ; one cow which had been quarantined on suspicion since August, 1899, when a tuberculin test was made and disease found on the farm, these animals I found free of disease and had the quarantine raised.

In April last an outbreak of anthrax occurred on the farm of Mr. A. B. Young, in the gore of Chatham township, seven head of young cattle died with this disease.

Hog Cholera and Swine Plague.—This disease has not appeared in this district in the past year.

I have been called out several times to see hogs that were in a very unthrifty condition, and thought might be diseased, but upon investigation found it due to mismanagement ; this was proven by change of food or giving proper care when the hogs made rapid improvement.

I visited Walpole Island frequently but found no disease.

I have the honour to be, sir,
Your obedient servant,

J. R. THORNE, V.S.,
Inspector for West Bothwell.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 26.

REPORT OF THE VETERINARY INSPECTOR FOR NORTH ESSEX, ONT.

(GEO. W. ORCHARD, V.S.)

WINDSOR, November 1, 1900.

SIR,—I beg to submit to you my report of work done for the Department of Agriculture, from November 1, 1899, to October 31, 1900.

1899.

November 11.—Gave 'certificate of health' to H. G. Arnold & Sons, Maidstone P.O., for eight sheep for export to the United States.

November 15.—Gave 'certificate of health' to Thomas Thompson, Windsor, for five cattle, going to United States.

November 25.—Placed in quarantine, one Jersey cow, five years old, imported from the United States for breeding purposes by N. H. Shipley, Charing Cross, P.O.

November 27.—Tested Jersey cow imported November 25 with tuberculin ; no reaction.

December 1.—Examined and forwarded to Department of Agriculture, a copy of test chart of four cattle imported for breeding purposes by A. & G. Rice, Curries, P.O.

December 2.—Released Jersey cow imported by N. H. Shipley.

December 11.—Placed in quarantine, one Jersey cow, imported from the United States for breeding purposes by Joseph Lovell, Windsor, P.O.

December 13.—Tested above cow with tuberculin ; received no reaction.

December 13.—Gave 'certificate of health' to J. J. Mason, for forty calves for export to the United States.

December 16.—Visited and quarantined for hog cholera, the farm of John Dawson, lot 5, Malden road, Maidstone township; found fourteen hogs on farm, six affected and eight in contact; slaughtered all. Appraised value, $52.50.

December 19.—Released Jersey cow imported by Joseph Lovell, Windsor, P.O.

December 19.—Inspected and passed at Grand Trunk Railway, one black cow, part Jersey, and one Jersey cow, forming part of 'settler's effects' of H. Wooley, from Minden, Mich., going to Walkerville, Ont.; no certificates of health accompanied them.

December 20.—Visited and quarantined for hog cholera, the farm of Joseph Quinlan, lot 6, South Middle road, Maidstone township; found seven diseased, and fourteen hogs in contact; slaughtered all. Appraised value, $55.

1900.

January 25.—Gave 'certificate of health' to John LaClair, Windsor, for one cow for export to the United States.

March 10.—Inspected and passed at the Michigan Central Railway, five hogs, forming part of 'settler's effects' of N. C. Hahn, from New Paris, Ohio, going to Port Arthur, and not accompanied by certificates of health.

March 12.—Examined and forwarded a copy of test chart of eight Hereford cattle, imported from the United States, for breeding purposes, by W. H. Hunter, Orangeville, Ont., and placed in quarantine, one Hereford calf, six weeks old, untested.

March 13 and 14.—Tested Hereford calf; no reaction.

March 13.—Visited and quarantined for hog cholera, the farm of Wm. Terry, lot 70, con. 1, Sandwich West township; found three hogs affected and eleven in contact; slaughtered all. Appraised value, $84.75.

March 14.—Inspected and passed at Canadian Pacific Railway, two heifers, two years old; one bull, one year old; one ram and two ewes, forming part of 'settler's effects' of J. Wacker, from Manchester, Mich., going to Alberta, N.W.T., and not accompanied by certificates of health.

March 16.—Inspected and passed at Grand Trunk Railway, two cows and three horses, forming part of 'settler's effects' of Samuel Guest, from Clark, South Dakota, going to Thamesville, Ont. No certificate of health.

March 19.—Released to W. H. Hunter, Orangeville, Ont., Hereford calf, quarantined March 12.

March 27.—Inspected and passed at the Canadian Pacific Railway, one cow, three years old; one heifer, two years old; and two horses, forming part of 'settler's effects' of S. D. Pierce, from Wood County, Ohio, going to Alameda, Assiniboia, not accompanied by 'health certificates.'

April 1.—Inspected and passed at the Canadian Pacific Railway, one red cow, four years old, forming part of 'settler's effects' of A. E. Wilson, from Cass City, Mich., and going to Edmonton. No certificates of health accompanied entry.

April 5.—Inspected and passed at Canadian Pacific Railway, five cows and one calf, forming part of 'settler's effects' of John K. McLeod, from Peck, Sanilac County, Mich., going to Alberta, not accompanied by health certificates.

April 6.—Placed in quarantine one Jersey calf, eight weeks old, imported from the United States, for breeding purposes, by Mrs. Flannery, Maidstone, P.O.

April 8.—Tested above calf with tuberculin; no reaction.

April 9.—Visited and inspected quarantined farms of John Dawson and Joseph Quinlan, Maidstone township, and found farms cleansed and disinfected, and applied for their release from quarantine.

April 10.—Inspected and passed at Canadian Pacific Railway, four cows, three years old, and two hogs, forming part of 'settler's effects' of M. Richert, from Wyandotte, Mich., going to Calgary; not accompanied by health certificates.

April 12.—Received and forwarded releases from quarantine to John Dawson and Joseph Quinlan, at Essex, P.O., Ont.

April 17.—Inspected and passed at Michigan Central Railway, three cows, two calves, five horses and one colt, forming part of 'settler's effects' of Wm. Biniwell, from Worster, Ohio, going to Calgary; no certificates of health accompanied stock.

April 18.—Released quarantined calf to Mrs. Flannery, Maidstone, Ont.

April 23.—Took charge of two Hereford heifers, imported by O'Neil Bros., Southgate, Ont., from the United States, for breeding purposes ; test chart rejected.

May 1.—Tested above heifers with tuberculin ; no reaction.

May 3.—Released heifers and forwarded to O'Neil Bros., Southgate, Ont.

May 9.—Gave 'certificate of health' to Wheeler & Kennedy, for eighty-two calves, for export to the United States.

May 29.—Visited and inspected the quarantined farm of Wm. Terry, Sandwich West township; found premises cleansed and disinfected, and asked for release from quarantine.

June 2.—Received and forwarded Wm. Terry's release.

June 8.—Gave 'certificate of health' to Wheeler & Kennedy, for forty-two calves, for export to the United States.

July 5.—Visited and inspected hogs on Scotten estate; found no evidence of hog cholera as suspected.

August 21.—Gave 'certificate of health' to George W. Bell, Windsor, for six sheep, for export to the United States.

August 18.—Examined and forwarded copy of test chart of bull calf, nine months old, imported from the United States, for breeding purposes, by Hon. John Dryden.

October 20.—Inspected and passed at Grand Trunk Railway, two cars of horses, from Oklahoma, going to Tavistock, Ont., most of which were coughing ; found no contagious disease.

I have the honour to be, sir,
Your obedient servant,

GEO. W. ORCHARD, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 27.

REPORT OF S. E. BOULTER, V.S., INSPECTOR AT NIAGARA FALLS, ONT.

NIAGARA FALLS, October 31, 1900.

SIR,—I have the honour to submit my report of animals coming into Canada at this quarantine port, during the interval between November 1, 1899, and October 31, 1900.

		Horses.	Cattle.	Sheep.	Swine.	Remarks.
June 12..	R. McCulloch, Snellgrove, Ont....	.... ..	1	....	....	Tested on Entry.
" 12..	W. Wilson, Brampton, Ont........	....	....	....	2	Quarantine 15 days.
April 3..	A. Miller, Haysville, Ont...	....	.... ..	....	1	" "
June 1..	Mrs. B. White, London, Ont.....	....	1	....	....	Tested in Quarantine.
" 7..	Geo. Green, Fairview, Ont.	....	....	....	2	Quarantined.
" 13..	Isaac Reed, Ardtrea, Ont........	.. ..	....	....	1	"
" 20..	J. H. Holmes, Norwich, Ont.. ..	....	....	....	1	"
July 21..	Cavan & Durham, Toronto, Ont..	....	....	....	1	"
Aug. 29..	Inspected at G. T. R. Depot......	....	....	1	....	"
Sept. 8..	R. Cooper, Welland, Ont.........	1	....	....	....	Inspected.
Oct. 1..	Blue Jean Co., Hamilton, Ont....	... ...	1	....	....	"
" 22..	Cavan & Durham, Toronto, Ont..	....	....	....	24	Quarantined.
" 30..	D. J. Galbraith, New-Castle, Ont.	....	1	....	....	Inspected.
		1	4	1	32	

Total number of animals imported—38.

I have the honour to be, sir,
Your obedient servant,

S. E. BOULTER, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

NIAGARA FALLS, October 31, 1900.

SIR,—I beg to submit a short summary of work done by me for the Department of Agriculture in this Niagara district, during the year ended October 31, 1900.

Four cases of hog cholera have been reported to me during the year, of these only two proved to be cholera, both cases being in the township of Stamford, county of Welland.

There were slaughtered at the two farms fourteen hogs actually diseased, of a total value of $53 ; and twelve contact hogs slaughtered, valued at $76.

The farms were placed under quarantine. I also visited a few farms that had been quarantined a short time previous on account of cholera and found that the cleansing and disinfection had been carried out to my satisfaction in all cases with one exception, that of Joseph Galleys. His farm being placed under quarantine the third time within two years. I decided not to recommend the release for at least one year.

I am pleased to report that no further outbreaks have occurred during the past summer in this district.

I have applied the tuberculin test to three herds of cattle, comprising in all fifty-four head ; only one reacting to the test which was slaughtered ; post mortem examination revealing lung lesions. I have tested with tuberculin, and issued certificates for export for thirteen animals going to United States.

I have also tested with tuberculin three animals while in quarantine, coming into Canada from United States, and found them healthy.

Only one case of sheep-scab was reported as being suspicious. On investigation it was found not to be scab. I think I am safe in saying scab has been completely eradicated in this district. One case of Glanders has come under my notice. The animal affected being a thoroughbred mare coming from the southern states, and sold at Fort Erie race track to C. L. Bradley, of Wellandport, Ontario. I applied the Mallein test, which produced a marked reaction. I reported the case to the local authorities and the animal was destroyed. A close inspection of horses coming into Canada for racing and wintering would be a good safeguard against the introduction of glanders.

I have the honour to be, sir,
Your obedient servant,

S. E. BOULTER, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 28.

REPORT ON INSPECTION WORK IN PRINCE EDWARD ISLAND.

(W. H. Pethick, V.S.)

Central Bedique, October 31, 1900.

Sir,—In accordance with instructions just received, I have the honour to submit a brief report of my work for the year ending October 31, 1900.

I have pleasure in stating that the general health of horses, cattle, sheep and swine on Prince Edward Island has been excellent during the year. I have visited different parts of the province to investigate the reported existence of anthrax, hog cholera, and other contagious diseases, but found nothing to confirm the report, the disease in all cases being due to causes other than of a contagious character.

During the past year I have had the pleasure of meeting large numbers of farmers and dairymen at meetings held in the various districts, and discussing with them the important matter of contagious diseases of animals, dealing more especially with tuberculosis in cattle, and I am glad to inform you that the stockmen of this province manifest increasing interest in this important matter. Temperature charts, and all information relating to the herds examined by me, have from time to time been forwarded to your department. I may just say that I find our stockmen not only anxious to rid their herds of this disease, but willing to give every assistance to any movement that may have for its object the eradication of tuberculosis from the province. In my opinion, this would not be a very difficult matter to accomplish.

The very limited extent of the disease on this island, and consequently the small amount of money necessary for compensation, the willingness of our stockmen to aid in the work, our isolated position, our strict provincial Act providing for the quarantine and testing of all incoming cattle that are not accompanied by a health certificate signed by an official veterinarian, and the object lesson the accomplishment of the work would be to the rest of the Dominion, encourage our people to hope that the matter may receive your favourable consideration.

During the past summer I had the honour of meeting Mr. Hodson, Live Stock Commissioner for Canada, and at his request, and in accordance with your instructions, I accompanied him on his tour of Pictou and Antigonish counties, in Nova Scotia.

During the summer months I have arranged my work so as to be as much as possible in Prince County, in order that I might be available to the shippers of live stock from the port of Summerside, and I am glad to be able to say that all animals examined by me previous to shipment to foreign ports were in excellent health and condition.

I have the honour to be, sir,
Your obedient servant,

W. H. PETHICK, V.S.,
Inspector of Stock for P.E.I.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 29.

REPORT ON CHARLOTTETOWN, P.E.I., CATTLE QUARANTINE STATION.

(ANDREW A. LECKIE, M.R.C.VS.)

CHARLOTTETOWN,
P.E. ISLAND, November 1, 1900.

SIR,—The following list of shipments make up the year's work at this port, commencing November 1, 1899, ending October 31, 1900:—

Month.	——	Horses.	Cattle.	Sheep.	Swine.
1899.					
November 3.....	The Ss. Bona Vista, Black Diamond line, for Newfoundland.....	2	19	121	....
" 8 ...	" Sch. Evelyn for West Indies......	24	4	22	...
" 9.....	" Ss. Polino, Dobell line, for Newfoundland........	....	....	221	....
" 23......	" Ss. Bona Vista, Black Diamond line, for Newfoundland.	2	22	350	6
" 28...	" Ss. Cacouna, " " "	2	....	78	....
1900.					
May 9.........	The Ss. Cacouna, Black Diamond line, for Newfoundland	14	54	42	....
" 9...........	" Ss. Polino, Dobell line " "	3	22	....	....
" 18........	" Ss. Bona Vista, Black Diamond line "	7	87	38	....
" 28........	" Ss. Cacouna " "	....	77	15	....
" 31............	" Sch. Omega, Demerara.	....	1	....	....
June 4............	" Ss. Bona Vista, Black Diamond line, for Newfoundland	1	70	30	....
" 6............	" Ss. Polino, Dobell line "	....	18	14	2
" 20............	" Ss. Greetlands " "	....	22	29	....
" 22	" Ss. Bona Vista, Black Diamond line "	1	49	87	19
July 3	" Ss. Polino, Dobell line "	....	15	97	....
" 9...........	" Ss. Bona Vista, Black Diamond line "	2	31	187	22
" 24...........	" Ss. Polino, Dobell line "	....	21	27	...
" 27.........	" Ss. Bona Vista, Black Diamond line "	1	29	108	6
August 13........	" Ss. Bona Vista " "	....	51	98	....
" 15.......	" Ss. Polino, Dobell line "	....	33	18	....
" 31........	" Ss. Bona Vista, Black Diamond line "	2	44	145	....
September 17.....	" Ss. Bona Vista " "	....	20	169	....
October 5.........	" Ss. Bona Vista " "	12	7	153	3
" 20........	" Ss. Cacouna " "	7	12	222	5

This comprises the shipment made from this port.

August 27—B. & M. Rattenbury, 240 sheep per rail from Charlottetown to United States via. Summerside.

These export shipments figure up as follows, to various countries from Charlottetown, P.E.I. :—

United States—Sheep, 240.

West Indies—Horses, 24 ; cattle, 5 ; sheep, 22.

Newfoundland—Horses, 56 ; cattle, 703 ; sheep, 2,249 ; swine, 63.

Imports—December 28, 1899, stallion Kalol by Kremlin, from United States.

I have the honour to be, sir,
Your obedient servant,

ANDREW A. LECKIE, M.R.C.V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 30.

CATTLE QUARANTINE.

(P. A. Robinson, V.S.)

Emerson, Man., November 13, 1900.

Sir,—I have the honour to report that the number of live stock inspected by me at the ports of Emerson and Gretna for the past twelve months ended October 31, 1900, is shown in the following tables :—

Port.	Horses.	Cattle.	Hogs.	Sheep.	Mules.
Gretna	1,077	304	156	160	61
Emerson	881	82	23	297	14
Total	1,958	386	179	457	75

I have the honour to be, sir,
Your obedient servant,

P. A. ROBINSON, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 31.

REPORT OF THE NORTH-WEST MOUNTED POLICE COMMISSIONER.

(A. Bowen Perry.)

Regina, November 18, 1900.

Sir,—I have the honour to submit my annual report of work performed for your department by the North-west Mounted Police, during the year ended October 31, 1900, together with the annual reports of the following veterinary inspectors, which give in detail the work they have performed :—

Inspector Burnett, V.S. and Staff Sergt. Fraser.	Macleod.
Staff Sergt. Farr, V.S.	Lethbridge.
" Hobbs, V.S.	Calgary.
G. P. Dillon, Esq., V.S.	"
J. A. Church, Esq., V.S.	"
G. H. Acres, Esq., V.S.	"
Staff Sergt. Sweetapple, V.S.	Edmonton.
" Mountford, V.S.	Prince Albert.
" Matthews, V.S.	Regina.
" Ayre	"
" Mitchell, V.S.	N. Portal.
" Coristines, V.S.	Maple Creek.
J. C. Hargraves, Esq., V.S.	Medicine Hat.

I am glad to be able to report that the general health of the stock in the Territories is good. No serious outbreak of disease has occurred amongst the cattle, and I think a comparison with last year shows a general improvement in condition.

Mange, which threatened to become serious in the Medicine Hat district a year ago, has been successfully coped with, though it is probable that it will again show itself this coming winter and spring. There have been but very few outbreaks of anthrax. Antinomycosis still exists throughout the whole Territories, but is not on the increase ; tuberculosis has not been prevalent.

Horses have suffered from typhoid fever along the Saskatchewan, from Prince Albert to Edmonton. The cause is attributed to the very wet season. Ten years ago the same disease was prevalent in the Edmonton and Prince Albert districts.

Some 45,000 head of fat cattle were inspected for export ; not more than fifty were found diseased.

The following table shows the district shipped from and number :—

Saltcoats, Assa	628
Yorkton, Assa	5,853
Qu'Appelle	1,581
Maple Creek	8,175
North Portal	2,090
Moosomin	4,901
Macleod	6,284
Lethbridge	3,894
Calgary	9,144

This inspection has thrown a lot of work on the veterinary staff, who have often not been able, without calling in assistance, to keep up with the work, and prevent delay to shippers.

In some districts the time of our veterinary surgeons has been entirely devoted to your department.

One thousand two hundred and sixty cattle were imported at North Portal, the property of settlers.

Two thousand six hundred and twenty-seven horses were brought in at North Portal, and one thousand one hundred and ten at Maple Creek. Staff-Sergeant Mitchell states that the horses brought in at North Portal were of a very good class.

A total of $1,638.60 has been collected as inspection fees at the different ports of entry, all of which has been refunded to your department from time to time.

CATTLE.

TUBERCULOSIS.

Four cases in all occurred in the Territories, two at Maple Creek, and two in the Prince Albert district. All were destroyed. This disease is not prevalent.

ANTHRAX.

There were two outbreaks in the Prince Albert district, and 16 head died. There was an outbreak at Blackwood, Assa., and another at Whitewood, Assa. Six animals died. The herds were quarantined, and no further deaths took place.

The Edmonton district, where the disease has hitherto prevailed, is reported this year as free.

ACTINOMYCOSIS.

Sixty animals were destroyed in the Territories during the year suffering with this disease. It is generally distributed ; 10 were destroyed in Alberta, 22 in Saskatchewan, and 28 in Assiniboia. The disease is distinctly decreasing owing to the strong measures which have been taken.

OPHTHALMIA AND EYE DISEASE.

Veterinary Staff-Sergt. Coristine and Mr. Dillon, V.S., both refer to this disease, which does not appear to be contagious. Staff-Sergt. Coristine describes it as follows :—

'The disease begins with a watery acrid discharge from the eyes, and a white spot directly over the pupil, from which an effusion gradually spreads over the eye, till the whole organ is affected and assumes a whitish appearance.

'The disease is accompanied by an acute inflammation which runs a course of two or three weeks, when it subsides and the eye gradually regains its normal appearance.

'I have taken considerable interest in this, and do not think it contagious at all, but think it is caused by alkaline dust, as I have noticed it nearly altogether in dry, hot weather, and in localities where there are alkaline sloughs.'

No ill effects seem to follow.

MANGE.

All veterinary inspectors think that this disease has been controlled, and if the same measures are persisted in next year, as this just passed, it ought to be wiped out. I apprehend that it will require vigilence at the spring round-ups, and a careful application of the necessary remedies.

SHEEP.

Two cases of sheep scab were discovered near Calgary and promptly dealt with ; the disease occurred in the same district last year.

HOGS.

Swine plague was reported at Strathcona last summer. The diseased animals were promptly quarantined and the disease stamped out.

HORSES.

Ninety-one horses were destroyed during the year for glanders. The following table shows distribution of the disease :—

Assiniboia from Moosomin to Moosejaw	41
Maple Creek	1
S.E. Assiniboia	11
Prince Albert district	24
Calgary district	6
Macleod district	5
Edmonton district	3
Total	91

This disease has existed in Assiniboia for many years, and does not seem to be decreasing. The police everywhere pay special attention to the disease, and all suspicious cases are promptly reported.

Staff-Sergt. Matthews alone examined 209 suspects, and destroyed 41.

TYPHOID FEVER.

The loss of horses from this disease has been great in the Prince Albert, Battleford and Edmonton districts. Even if a horse attacked does recover the animal seems to be useless for a long time. In 1890-91, the disease was very prevalent in Prince Albert district. It appears to be from unpreventable causes.

GENERAL REMARKS.

All importations of stock from the United States have been very carefully inspected and not a single diseased animal found.

You are aware that stock ranging in Dakota and Montana, contiguous to the boundary line, wander across into the territories attracted by better pasturage, or driven by storms. This has been a matter of complaint for many years on the part of Canadian ranchers and police patrols, and especially employed men have attempted to check it. The great extent of country renders any such attempt almost futile. It is suggested that the American ranchers are not averse to aiding and directing their cattle to our luxurious grazing lands. If any such cases could be established, a vigorous application of the customs regulations would at once check the tendency. A certain control could be exercised if all round-ups by Americans were under police supervision, and all cattle taken across the line were properly inspected to see that there was no disease, and that no Canadian cattle were carelessly driven off.

In concluding my report, I am pleased to assure you that the veterinary inspectors have taken keen interest in their work. The officers commanding districts have worked energetically to carry out the regulations of the department. All instructions from me are given through these officers, and I hold them responsible that the work is done. Thus a great deal of important duty is imposed upon them for which they receive no remuneration, and I would respectfully ask that you allow them one hundred dollars per annum, the same as your inspectors receive.

I have the honour to be, sir,
Your obedient servant,

A. BOWEN PERRY,

Commissioner North-west Mounted Police.

No. 32.

REPORT ON CATTLE QUARANTINE STATION, VANCOUVER, B.C.

(J. W. Bland, V.S.)

Vancouver, B.C., November 14, 1900.

Sir,—I have the honour to report that the general health of horses, cattle, sheep and swine in the province of British Columbia during the past year has been good with few exceptions.

On May 30, I inspected 48 head of American merino sheep, owned by Pliny B. Norton, of Addison, Vermont, U.S.A., valued at $40,000—a magnificent flock indeed. Mr. Norton had eight new wooden crates built here for their ocean voyage to Sydney, New South Wales. Mr. Norton and myself removing them from palace horse car No. 58918, Canadian Pacific Railway, to wooden crates, with greatest care and animals comfort.

On July 11, I inspected and quarantined, according to regulations, one Jersey bull for stud purposes, owned by F. V. Harris. Giving tuberculin test without reaction.

According to regulations I inspected monthly the following animals, and it is gratifying to state without requiring to resort to Mallein test for horses or tuberculin test for cattle. I may add our bunch of cattle from the Okanagan district, some 70 in number, would be admired even at the Guelph fat stock show.

Again I have to thank the officers of Her Majesty's Customs for their kindness and assistance at quarantine station.

Appended is a detail of monthly statement showing the number of animals inspected by me at this port.

INSPECTIONS.

——	Horses.	Mules.	Cattle.	Sheep.	Swine.
1899					
November	1		2		
December					
1900					
January	1				
February	20				
March	73	12	56		
April	23		205	125	52
May	63		265	279	14
June	66		264	515	179
July	32		730	1,278	192
August	58		578	703	199
September	12		580	455	60
October			77		
Total	349	12	2,757	3,385	696

I have the honour to be, sir,
Your obedient servant,

J. W. BLAND, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 33.

REPORT ON CATTLE QUARANTINE STATION, VICTORIA, B.C.

(S. F. TOLMIE, V.S.)

VICTORIA, B.C., October 31, 1900.

SIR,—I have the honour to submit to you a report of the animals inspected at this port since July 20, the date of my appointment as inspector.

Sixty-three horses were inspected, sixty-one of which were imported, and two exported to California, for racing purposes. The horses imported were principally medium weight draft animals, and the balance livery and delivery horses, with a few unbroken bronchos. They are nearly all used in Victoria and its immediate vicinity, and were a good useful lot.

The four cattle inspected were all grade Jerseys, and good specimens, and were brought here by settlers.

One hundred and fifty-five sheep were imported for feeding and breeding purposes. One was a very good Hampshire Down ram, and the rest were grade Southdowns of only fair quality.

Thirty hogs passed inspection and were quarantined for the required period. They were Chester Whites and Berkshires, and a very good lot.

I applied the tuberculin test to four cattle, all of which passed the test.

The health of the animals in quarantine, in this district generally, has been good. No animals were condemned. Appended you will find a detailed list of animals inspected.

I have the honour to be, sir,
Your obedient servant,

S. F. TOLMIE,
V. S.

The Honourable
The Minister of Agriculture,
Ottawa.

REPORT of Animals Inspected at Victoria, B.C., from July 20, to October 31, 1900.

Date.	Name of Importer.	Whence Imported.	Destination.	Animals Inspected.				Remarks.
				Horses.	Cattle.	Sheep.	Swine.	
July 22	H. S. Ives	Washington	Sidney Island			101		
Aug. 2	B. C. Market Co.	Oregon	Victoria	10				
" 12	Hy. Croft	Washington	"	2				
" 24	L. Goodacre	Oregon	"	4				
" 28	Wm. Lewtas	California	"	2				
Sept. 5	S. Huston	Washington	"	2				
" 12	John Richardson	Michigan	Prevost Island			1		
" 18	H. Lovell	Washington	Victoria District	1	4		27	Permission given to quarantine swine in Victoria Dist.
" 28	Jones & McNeill	Oregon	Victoria	18				
" 29	J. A. Lawrence	Washington	"	1				
Oct. 2	P. Crause	"	"	3				
" 5	West Minstrel Co	"	"	2				
" 16	A. R. Milne	"	"	1				
" 21	Wm. Munro	"	James Island			53		
" 29	Joseph Bland	Ohio	Victoria				3	Permission given to quarantine swine on Sampson St., Victoria.
" 30	Jones & McNeill	Idaho & Oregon	"	15				

S. L. TOLMIE, V. S.,
Veterinary Inspector.

No. 34.

REPORT OF VETERINARY INSPECTOR AT NELSON, B.C.

(J. A. Armstrong, V.S.)

Nelson, B.C., November 1, 1900.

Sir,—I have the honour to submit to you this, my report for the year ended October 31, 1900.

On November 1 I was called to the hog ranch of F. T. Hurry, where I found two hundred and seven head of swine, forty-eight of which were suffering from hog cholera. I had them all slaughtered and the premises disinfected.

On November 14 I went to the home of Joseph Blanchard, of Pilot Bay, B.C., and found four swine and one sow suffering from hog cholera. Had them all slaughtered and burned and the premises disinfected.

During the month of November two horses were imported from the United States to Ymir, B.C.

During the month of December I inspected the following : two horses for Ymir, B.C.; three horses for Molly Gibson Landing, B.C.; one horse for Nelson, B.C.

During the month of January : three horses for Nelson, B.C.

During the month of February : two horses for Molly Gibson Landing; eighteen horses for Nelson, B.C.; seventeen horses for Five Mile Point.

During the month of March : one horse for Erie, B.C.; one hog for Erie, B.C.

During the month of April : Five milch cows for Kaslo, B.C.; four pigs for Salmo, B.C.: two horses for Erie, B.C.; seven milch cows for Nelson, B.C.

During the month of May : one cow for Waneta, B.C; seven horses for Nelson, B.C.; two cows for Nelson, B.C.; two horses for Salmo, B.C.; one horse for Waneta, B.C.

During the month of June : fourteen horses for New Denver ; three horses for Erie, B.C.; one cow for Bedlington, B.C.; one horse for Nelson, B.C.; eight milch cows for Nelson, B.C.; four cows for Nelson, B.C.

During the month of August : one bull calf for Kaslo, B.C.; two milch cows for Sayward, B.C.; eleven head of cattle for Kaslo, B.C.

During the month of September : one cow for Bedlington, B.C.; six horses for Nelson, B.C.

During the month of September : ten horses for Nelson, B.C.; one horse for Ymir, B.C.; three cows for Kaslo, B.C.

During the month of October : ten horses for Nelson, B.C.; one horse for Ymir, B.C.; three cows for Kaslo, B.C.

During the year P. Burns & Co. imported six thousand five hundred and forty-three sheep for slaughter.

On September 4 last, I was notified of an outbreak of disease among cattle ranging in Kootenay Landing. On investigation I found that they were suffering from anthrax. The dead animals I had burned and the ashes buried, moved all the stock up into the mountains, and the disease subsided.

I have the honour to be, sir,
Your obedient servant,

J. A. ARMSTRONG, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 35.

REPORT OF VETERINARY INSPECTOR AT GRAND FORKS, B.C.

(S. C. Richards, V.S.)

Grand Forks, B.C., November 1, 1900.

Sir,—I have the honour to submit my annual report of animals imported into the Kettle River district for the year ending October 31, 1900.

The following animals were imported from the United States :—

Month.	Horses.	Cows.	Swine.	Sheep.
November	17	8	91	....
December	4	....	....	....
January	6	....	....	....
February	7	15	....	....
March	4	....	....	71
April	11	7	47	....
May	26	7	81	21
June	66	....	....	126
July	3	....	9	....
August	2	....	....	....
September	....	15	60	98
October	4	2	....	....
Total	150	54	197	316

Out of 54 cows 6 were found to be tuberculous, 5 of which were imported from the same farm in Washington, U.S.A. I am glad to say we have not had a recurrence of hog cholera this year, which proved so destructive last year in comparison to the number of hogs in the district. Four horses were killed, being affected with glanders. A number of horses have died from typhoid fever during the summer and fall months. This fever amongst horses in this district is the most fatal disease we have to contend with, and more especially amongst range horses, due to the advanced stage of the disease before it is discovered and the unfavourable conditions for treatment.

I have the honour to be, sir,
Your obedient servant,

S. C. RICHARDS, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 36.

REPORT ON EAST AND NORTH KOOTENAY DISTRICT, B.C.

(W. S. Bell, V.S.)

Cranbrook, B.C., October 31, 1900.

Sir,—I have the honour in accordance with your instructions to submit a report of my work for the year ending October 31, 1900.

During the past year I have had several outbreaks of swine fever, which in most cases proved fatal to the herd. I attributed the cause to the food, being slops from kitchens and hotels.

I have also had very bad outbreak of strangles, which took an irregular form, a number of the animals died, and several I destroyed. It was confined principally to Indian or native horses. I found very few cases among the better bred or imported ones. I find the native are more susceptible to all diseases of such kind on account of their being inbred.

I had one outbreak of glanders. Had the animals affected destroyed. I also stabled and quarantined a number that had a chance to contract the disease, and tested them, but no further outbreak occurred.

I have the honour to be, sir,
Your obedient servant,

W. S. BELL, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

STATEMENT of Stock Inspected.

Date.	Name.	Cattle.
1899.		
Nov. 23....	McGinis & Co.	18
„ 24....	McConell.	6
Dec. 21....	McGinis & Co.	94
„ 23....	„	39
„ 24....	„	82
1900.		
Jan. 23 ...	„	17
„ 30....	P. Burns & Co...	17
„ 31....	McGinis & Co..............	18
Feb. 4....	„	16
„ 6....	„	18
„ 16...	„	20
May 5....	„	18
„ 16....	„	16
„ 18....	„	18
„ 23.. .	. „	18
April 6....	McConell.	6
„ 7....	McGinis & Co...	20
„ 25....	„	18
„ 26....	„	17
„ 30....	„	17
June 6....	„	128
„ 13....	P. Burns & Co..............	20
„ 30....	McGinis & Co.	10
July 9...	„	22
„ 13....	„	15
„ 21....	P. Burns & Co......	160
„ 29....	McGinis & Co.	20
„ 30....	„	15
Aug. 4 ...	„	20
„ 12....	„	20
„ 18....	„	20
„ 22....	McConell.............. ...	28
„ 30....	McGinis & Co.	18
Sept. 8....	„	21
„ 22....	„	21
Oct. 1....	M. Jackson, Carberry	83
„ 7....	McGinis & Co.	67
„ 9....	B. Morden.....	7
„ 10...	W. Gouldie....	17
„ 12....	McGinis & Co.	21
„ 15....	G. Mitchell.............	83
	Total..	1,300
1900.		Horses.
Jan. 12....	Laurie Bros., glanders.	2
Mar. 16 ...	Pat. Quirk, Fort Steel, glanders	6
„ 25....	J. Tripp, glanders, 2 destroyed	4
„ 26....	D. H. Fausette, glanders, tested...	4
June 11....	M. Balongie, Fort Steel, glanders	1
June 11....	A. O Bell, Fort Steel, glanders	1
July 1....	James Ryan, inspected. ...	6

Date.	Name.	Horses.
1900.		
July 6 ...	W. H. Bennett, Kallespell, U.S	12
„ 7 ...	John Norgood Oregood, Kallespell, U.S.	12
„ 22....	James Ryan, Kallespell, U.S. .	7
„ 30 ...	Indian House, Kallespell, U.S.	75
Aug. 1.. .	Indian House, Kallespell, U.S., 2 destroyed.	15
„ 3...	Indian House, Kallespell, U.S., 1 destroyed..........	5
„ 6....	Indian House, Kallespell, U.S., 3 destroyed...... ...	3
„ 7 . .	Indian House, Kallespell, U.S.	25
„ 20...	Indian House, Kallespell, U.S., 2 destroyed...	7
„ 24....	Indian House, Kallespell, U.S., 3 destroyed..........	150
„ 29....	M. Hambly House.... . ..	18
Sept. 3....	Teachers' House	2
„ 4...	Muir & Co	2
„ 7 ...	L. Doupe, C.P.R. survey.	1
„ 8....	Vandicor & Co	1
„ 17....	Robinson & McKenzie..	2
Oct. 9....	Manly Snider, Kallespell, U.S., for Red Deer.......	3
„ 10...	Charles Bachand, Kallespell, for Red Deer.......... ...	3
„ 24 ...	Charles Steers, Kallespell, U.S.	13
	Total....................	378
1899.		Hogs.
Nov. 15....	J. McMillan..... .	45
„ 11....	McGinis & Co.	145
„ 24....	McConell........... .	85
1900		
Mar. 26....	„	82
April 16....	„	20
May 19....	McGinis & Co.	135
June 4....	St. Eugene Mission.	20
Sept. 15 ..	J. Carroll.	5
„ 23....	M. Pell..	66
Oct. 7...	McGinis & Co.	67
	Total.....	680
1899.		Sheep.
Nov. 21....	McGinis & Co.	170
1900		
May 9....	„	160
June 22....	„	207
„ 25....	„	215
	Total....	752

W. S. BELL, V.S.,

Dominion Veterinary Inspector.

No. 37.

REPORT OF VETERINARY INSPECTOR AT ROSSLAND, B.C.

(C. E. Cornell, V.S.)

Rossland, B.C., November 1, 1900.

Sir,—I have the honour to submit to you this my report of stock inspected at the ports of entry of Rossland and Trail, for the year ended October 31, 1900.

The importations were mainly dairy cattle. They all received the tuberculin test. These were several found affected with tuberculosis, and they were slaughtered or returned from whence they came.

November, 1899.—Twenty-nine cows, one bull, one horse.
December, 1899.—Twenty-eight cattle, one horse.
January, 1900.—Twelve cows.
March, 1900.—Twenty-two cows, 63 hogs.
April, 1900.—Seventeen cows.
May, 1900.—Thirty-one cows, three horses.
June, 1900.—Fifty-six horses, 2 mules.
July, 1900.—Thirty-two cows, five horses.
August, 1900.—Twenty-nine cows, eighty hogs, 2 horses.
September, 1900.—Twenty-two cows, three horses.
October, 1900.—Two cows, eleven horses.

I have the honour to be, sir,
Your obedient servant,

C. E. CORNELL, V.S.,
Veterinary Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 38.

REPORT ON PICTOU CATTLE DISEASE IN NOVA SCOTIA.

(GEORGE TOWNSEND, V.S.)

OFFICE OF THE INSPECTOR OF STOCK,
NEW GLASGOW, N.S., October 31, 1900.

SIR,—I have the honour to submit, herewith, a statement showing number of cattle slaughtered for 'Pictou Cattle Disease' and amount of compensation paid therefor, during the year ended October 31, 1900.

I have the honour to be, sir,
Your obedient servant,

GEORGE TOWNSEND, V.S.

STATEMENT of Cattle slaughtered and Amounts paid, from November 1, 1899 to October 31, 1900.

Month.	Number, slaughtered.	Amount Paid.	Month.	Number slaughtered.	Amount Paid.
		$ cts.			$ cts.
November	12	84 33	Brought forward	35	258 33
December	5	40 00	May	10	74 00
January	1	10 00	June	18	139 33
February	4	24 00	July	32	257 00
March	5	39 00	August	27	222 00
April	8	61 00	September	15	122 33
			October	12	79 00
Carried forward	35	258 33			
			Total	149	1,151 99

GEORGE TOWNSEND, *V.S*,

The Honourable
The Minister of Agriculture,
Ottawa.

No. 39.

REPORT OF LIVE STOCK CARS AND YARDS.

(M. Auger).

Ottawa, November 12, 1900.

Sir,—I have the honour to submit to you my report covering the period from November 1, 1899, to October 31, 1900. During the year I have visited the large shipping stations of Ontario and Quebec to see that live stock cars were cleaned as soon as unloaded, which I found was generally done, an improvement on the year previous.

In travelling through the country I noticed that unloaded cattle cars were well cleaned as required.

There has also been some improvement on cattle and hog cars passing in transit from points in the United States through Canada to other points in the United States, more especially from Sarnia and Windsor to Buffalo, N.Y.

The cattle yards have been much improved and the different railroad companies seem to show more willingness to improve them than in the past, and I trust that before long they will see their way to have water in all their cattle yards where one car or more is shipped per week.

I have the honour to be, sir,

Your obedient servant,

MICHEL AUGER,
Inspector of Live Stock Cars and Yards.

The Honourable
The Minister of Agriculture,
Ottawa.

INDEX TO APPENDICES.

QUARANTINE.

CATTLE QUARANTINE.

PLATE 1.—ROAD PLANTING ON MAIN DRIVE LEADING TO OFFICE BUILDING, CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.
(ALL OF THESE TREES AND SHRUBS HAVE BEEN PLANTED SINCE 1887).

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, LL.D.
AGRICULTURIST	J. H. GRISDALE, B. AGR.
HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
ENTOMOLOGIST AND BOTANIST	JAS. FLETCHER, LL.D.
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, NAPPAN, N.S.	R. ROBERTSON
HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, BRANDON, MAN.	S. A. BEDFORD
" " " INDIAN HEAD, N.W.T.	ANGUS MACKAY
" " " AGASSIZ, B.C.	THOS. A. SHARPE

FOR

1900

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1901

[No. 16—1901.]

Office Building and Museum of the Central Experimental Farm.

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, December 1, 1900.

SIR,—I beg to submit for your approval the fourteenth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended, reports from the following officers of the Central Experimental Farm : From the Agriculturist, Mr. J. H. Grisdale ; from the Horticulturist, Mr. W. T. Macoun ; from the Chemist, Mr. Frank T. Shutt, and from the Entomologist and Botanist, Dr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr. R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba, at Brandon ; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms ; also of scientific investigations in the chemical laboratory and the information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms is a gratifying evidence of the desire for information among this class of the community, also of the high esteem in which these records of the work of the farms are held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR, WM. SAUNDERS, LL.D., F.R.S.C., F.L.S.

In submitting the fourteenth annual report giving particulars of some of the operations conducted on the five experimental farms established by the Dominion Government for the benefit of farmers residing in the different climates of Canada, it is hoped that the facts presented, which are the results of careful observation and experiment, will be found of much practical utility.

The reports of the several officers engaged in the different lines of work contain much information on a variety of subjects, all bearing on practical agriculture or horticulture. The best methods of maintaining the fertility of the land, and of economizing the fertilizers produced on the farm, the most useful measures to adopt in preparing the land for crop, how and when seed should be sown, and which are the varieties which experience has shown to be the best and most productive, are all referred to. Much information is also given as to the care of cattle, swine, sheep and poultry and the most economical and profitable methods to adopt in the feeding and breeding of these different classes of stock for the production of meat, dairy products and eggs. The growing of all the different classes of fruit and vegetables has received much attention and lists have been prepared of varieties found specially suitable to certain localities and climates with particular reference to the needs of farmers. The selection and care of the many different sorts of useful timber and ornamental trees adapted to Canada has received much attention, embracing such varieties as are specially suitable for shelter belts and others adapted for the beautifying of homes.

The subjugation of insect pests and noxious weeds has claimed close observation and study, so also have the many chemical problems which present themselves in connection with agricultural pursuits, the solution of which is most important to success. These with many other useful subjects are under constant investigation and experiment. By the use of such information presented from year to year, improvements have taken place in farm life, leading to the avoidance of waste, and to economy in production, with increased profits as the result.

The interdependence of all branches of farm work and a knowledge of how these can best be carried on in conjunction so as to produce the most satisfactory returns under the varied conditions which surround the settler in different parts of the Dominion, are items of information of deep interest to farmers everywhere. The days are passing by when farmers will rest satisfied with the risky position of depending entirely on one crop. With adverse seasons, which occur more or less often in almost every country, such men on such occasions lose ground financially, and sometimes to such an extent as to take them several years to recover. The best and happily the system most generally followed now is mixed farming. This is eminently adapted to all parts of Canada, and to the rapid growth of this system of diversified agriculture may be attributed much of the phenomenal increase in the exports of Canadian agricultural products, which has taken place during the past ten or twelve years.

During the past season the writer has had an opportunity of visiting Great Britain and France, and of noting the progress of agriculture there, and the results produced by the measures which have been adopted to assist farmers in their work, further particulars of which will be found in another part of this report. The experience gained but strengthens the opinion that Canadian farmers are well to the front in almost everything, and that there is no other country where there are so many useful measures in operation designed to assist the farmer in overcoming the difficulties he has to contend with, and to aid him in his endeavours to acquire a better practical knowledge of the important principles which underlie his useful occupation. It is gratifying to know that the farmers of this country are eager for information and always ready to take advantage promptly of every opportunity of improving their condition. With such a spirit of enterprise abroad and the enormous agricultural resources awaiting development in Canada, the future prosperity of the country is assured.

This fourteenth annual report of the work of the experimental farms is submitted to the farmers of Canada with the earnest hope that it may prove helpful to them in the great work they have in hand of advancing the agricultural interests of this country.

EXPERIMENTAL WORK

CONDUCTED AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, ONTARIO.

EXPERIMENTS WITH OATS.

Eighty-two varieties of oats have been under trial in the uniform test plots at the Central Experimental Farm during 1900. These experiments have been conducted in all cases to gain information as to the relative productiveness, earliness and other characteristics of the different sorts. The soil on which these oats were sown was a sandy loam which received a dressing of barn-yard manure during the winter of 1898-9 of about 12 tons per acre. The previous crop was turnips. After the turnips were taken off the land was drilled up in ridges $2\frac{1}{2}$ feet apart and left in this condition until the following spring, when it was cultivated twice with a two-horse cultivator and twice with a smoothing harrow. The seed of all the varieties was sown on May 4, on plots of one-fortieth of an acre each, seed being used in each case at the rate of 2 bushels per acre. Among the varieties tested this year were the following thirteen cross-bred sorts, all of which have been originated on the experimental farms:—Holland, Cromwell, Olive, Oxford, Pense, Miller, Brandon, Milford, King, Medal, Kendal, Master and Russell. Waverley and Tartar King are two new cross-bred oats recently introduced by Garton Bros., of Newton le Willows, England. Longhoughton is a favourite Scotch variety, and Anderbecker, Leutewitzer, Selchower and Uberfluss have been received for test from Germany.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
					Inches.		Inches.		Bush.	Lbs.	Lbs.	
1	Holstein Prolific.....	Aug.	14	102	46—49	Stiff......	$7\frac{1}{2}$— $9\frac{1}{2}$	Branching	82	18	$35\frac{1}{5}$	Slightly.
2	White Giant.........	"	14	102	45—48	"	8 — $9\frac{1}{2}$	" .	78	8	$36\frac{1}{4}$	"
3	Black Beauty..	"	16	104	44—48	Weak ..	9 —10	" .	76	16	$33\frac{1}{5}$	Considerably.
4	Hazlett's Seizure....	"	16	104	48—52	Stiff......	8 — $9\frac{1}{2}$	" .	74	24	$36\frac{1}{4}$	Slightly.
5	Waverley............	"	14	102	48—52	"	8 — $9\frac{1}{2}$	" .	74	4	37	"
6	Oderbruch...........	"	15	103	45—49	"	8 — $9\frac{1}{2}$	Half Sided	73	32	39	"
7	Calif'nia P. Blk. C. E. F	"	20	108	50—54	"	9 —10	Sided.....	72	32	$32\frac{1}{4}$	Considerably.
8	Joanette.............	"	24	112	38—42	"	7 — 8	Branching	70	20	38	Slightly.
9	Early Blossom.......	"	17	105	47—51	"	$7\frac{1}{2}$— $8\frac{1}{2}$	Half Sided	70	20	$35\frac{1}{2}$	"
10	Golden Tartarian	"	22	110	46—50	"	9 —10	Sided.....	69	14	33	"
11	Golden Giant........	"	22	110	36—40	"	9 —10	"	68	28	35	Considerably.
12	Holland.............	"	22	110	36—40	"	9 —10	"	68	8	35	"
13	Cromwell............	"	14	102	48—52	"	9 —10	Half Sided	68	8	$38\frac{1}{2}$	Slightly.
14	American Beauty....	"	14	102	44—48	Medium..	$8\frac{1}{2}$—$9\frac{1}{2}$	Branching	68	8	36	"
15	Olive	"	17	105	44—48	Stiff......	9 —10	Half Sided	67	22	$35\frac{3}{4}$	"
16	Eureka.........	"	11	99	40—44	"	$8\frac{1}{2}$—10	Branching	67	22	37	"
17	Buckbee's Illinois....	"	13	101	45—48	"	$8\frac{1}{2}$— $9\frac{1}{2}$	" .	67	2	$40\frac{1}{4}$	"
18	Oxford	"	16	102	46—50	"	8 — 9	Half Sided	65	30	38	"

Oats—Test of Varieties—*Continued.*

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
19	Bavarian	Aug. 22	110	46—50	Stiff	9 —10½	Branching	65	10	32½	Considerably.
20	Blk. Tartarian, C. E. F.	" 20	108	50—54	"	8½— 9½	Sided	64	24	38	Slightly.
21	Banner	" 16	104	46—50	"	9 —10	Branching	64	4	36	"
22	Wide Awake	" 18	106	47—51	"	8 — 9½	"	63	18	38½	"
23	Uberfluss	" 14	102	44—48	"	7½— 8½	"	63	18	36½	"
24	Mennonite	" 19	107	40—46	Medium	7½— 8½	" "	63	8	37	Considerably.
25	Imp. Ligowo, C. E. F.	" 14	102	45—49	Stiff	8½— 9½	" "	62	12	37	Slightly.
26	Wallis	" 16	104	46—50	"	9 —10	"	62	12	35	"
27	Early Archangel	" 14	102	46—50	"	8½— 9½	"	61	7	41½	"
28	White Schonen	" 16	104	48—52	"	8½— 9½	"	61	6	37	"
29	Early Golden Prolific	" 17	105	43—47	Medium	8½— 9½	"	61	6	34½	Considerably.
30	Flying Scotchman	" 11	99	46—50	Stiff	9 —10½	"	61	6	38¾	Slightly.
31	Pense	" 17	105	46—50	"	8½— 9½	Half Sided	61	6	36	Considerably.
32	Tartar King	" 10	98	38—42	"	9 -10	Sided	60	20	35	Slightly.
33	Improved Ligowo Imp	" 14	102	45—49	"	8½— 9½	Branching	60	—	37	"
34	Prize Cluster	" 10	98	42—46	"	7 — 8	"	60	—	41¾	"
35	New Zealand	" 25	113	46—50	"	9 —10	Sided	60	—	35½	"
36	Welcome	" 11	99	40—45	Medium	8 — 9	Branching	60	—	39½	"
37	Prol. Blk. Tartarian Im	" 20	108	50—54	Stiff	8½— 9½	Sided	59	14	36	"
38	Anderbecker	" 15	103	44—48	"	8½—10	Branching	59	14	35¼	"
39	California Prol. Blk, Im	" 20	108	50—54	"	9 —10	Sided	59	14	33	Considerably.
40	American Triumph	" 19	107	45—49	"	8 — 9½	Branching	58	28	34	Slightly.
41	Great Northern	" 15	103	35—40	"	7½— 8½	"	58	28	36¼	"
42	Thousand Dollar	" 13	101	46—49	"	8 — 9	"	58	8	38½	"
43	Danish Island	" 17	105	34—38	Weak	6½— 8	"	58	8	35	Badly.
44	Abundance	" 22	110	40—45	"	8 — 9	"	58	8	33¾	Considerably.
45	Columbus	" 14	102	36—40	Medium	7½— 8½	"	57	22	34¼	Slightly.
46	Abyssinia	" 16	104	46—50	Stiff	7 — 8	Half Sided	57	22	39	Badly.
47	Early Maine	" 14	102	40—44	Weak	7½ - 8½	Branching	57	2	37	Considerably.
48	Miller	" 16	104	46—50	Stiff	8½— 9¾	"	56	16	36½	"
49	Liberty	" 15	103	38—42	"	8 — 9	"	56	16	36	"
50	Newmarket	" 15	103	45—50	Weak	8 — 9½	"	56	16	38	"
51	Poland	" 11	99	40—45	Stiff	7½— 9	"	56	16	38	Slightly.
52	Brandon	" 22	110	44—48	"	8½—10	Half Sided	55	10	34	Considerably.
53	Lincoln	" 15	103	45—50	"	8½— 9½	Branching	55	10	36¾	Slightly.
54	Golden Beauty	" 24	112	46—50	"	8½—10	"	54	4	35	Considerably.
55	Rosedale	" 14	102	40—43	"	7½— 8½	Half Sided	54	4	40¾	"
56	Victoria Prize	" 10	98	40—45	Medium	7 — 8	Branching	54	4	42½	"
57	Milford	" 17	105	40—45	Stiff	8 —10	Half Sided	52	32	40	Slightly.
58	Bayonet	" 11	99	36—42	"	8 — 9	Branching	52	32	39½	
59	Salines	" 25	113	40—46	"	7½— 8½	"	51	26	35	Badly.
60	Longhoughton	" 16	104	44—48	"	8 — 9	"	51	26	31½	Slightly.
61	Sensation	" 14	102	45—48	"	8 — 9½	"	51	26	38	"
62	White Russian	" 17	105	45—50	"	7½ - 8½	"	51	26	39	"
63	Early Gothland	" 14	102	45—50	"	7½— 8½	Half Sided	51	26	40¼	"
64	Imported Irish	" 13	101	45—50	Weak	8 — 9	Branching	51	26	40½	Considerably.
65	Siberian	" 20	108	46—50	Stiff	8 — 9	"	50	20	36	"
66	King	" 18	106	40—46	Medium	7½— 9	"	50	20	36	Slightly.
67	Leutewitzer	" 20	108	38—42	"	7½— 9	"	50	20	31¾	"
68	Improved American	" 17	105	44—48	Stiff	8 — 9½	"	50	20	35½	"
69	Bonanza	" 10	98	36—40	Weak	7½— 8½	"	50	20	42½	"
70	Medal	" 16	104	46—50	Stiff	8½— 9½	Half Sided	50	20	38	Considerably.
71	Kendal	" 23	111	38—42	Weak	7½— 8½	"	48	8	35¼	Badly.
72	Early Dawson	" 9	97	36—40	"	7½— 9	Branching	47	22	40½	Considerably.
73	Coulommiers	" 24	112	36—40	"	8 — 9	"	47	2	37½	Badly.
74	Selchower	" 20	108	40—46	Stiff	7 — 9	Sided	47	2	34	Slightly.
75	Mortgage Lifter	" 10	98	36—40	"	8½—10	Branching	47	2	41¼	Considerably.
76	White Wonder	" 9	97	40—43	Weak	8 — 9	"	47	2	42	"
77	Doncaster Prize	" 16	104	39—44	"	8½— 9½	"	42	24	35¾	Badly.
78	Master	" 16	104	45—50	Stiff	8 — 9	Half Sided	42	12	37¼	Slightly.
79	Black Mesdag	" 13	101	44—47	"	8 — 9	Branching	41	6	37	Considerably.
80	Russell	" 17	105	40—45	"	8 — 9	Half Bra'h	41	6	35¾	"
81	Cream Egyptian	" 20	108	36—42	Weak	7½— 8½	Half Sided	35	30	36½	"
82	Winter Grey	" 19	107	35—40	"	6½— 8	Branching	35	10	40	Badly.

EXPERIMENTS WITH OATS GROWN AFTER DIFFERENT CROPS.

During the past season six plots, one-fortieth acre each, have been used in this test to ascertain what effect different crops have on the soil they are sown upon, and how far they influence a subsequent oat crop. The soil in this instance was a sandy loam of good quality. After the crops were taken off last autumn, the land was gang-ploughed shallow, and later in the fall it was ploughed to the depth of about 7 inches. In the spring of 1900 it was harrowed twice with disc-harrow and twice with smoothing harrow, and all sown with Sensation oats at the rate of 2 bushels per acre on May 4. They were cut on August 14, with the following results :—

Previous Crop in 1899.	Sensation Oats in 1900 Yield per acre.		Length of Straw.	Length of Head.
	Bush.	lbs.	Inches.	Inches.
Plot 1 Flax	49	14	40—45	8—9½
Plot 2 Grain	58	28	43—48	8½—9½
Plot 3 Horse Beans	69	14	46—50	9—10
Plot 4 Soja Beans	49	14	40—45	8½—9½
Plot 5 Corn	52	32	40—45	8½—9½
Plot 6 Millet	43	18	36—40	7¾—8½

EXPERIMENTS WITH BARLEY.

Fifty-nine varieties of barley have been under test in the uniform trial plots for 1900. Twenty-four of these have been two-rowed sorts and thirty-five six-rowed. The land chosen for the barley plots was a heavy sandy loam, mixed with clay. The previous crop was clover hay. The land was ploughed late in the autumn to the depth of about 7 inches and left in that condition until the following spring, when it was harrowed twice with the disc-harrow and twice with the smoothing harrow before sowing. The size of the plots was one-fortieth of an acre each, and they were all sown on May 1, the two-rowed at the rate of 2 bushels per acre and the six-rowed at the rate of 1¾ bushels per acre. The seed of all these varieties of barley, both two-rowed and six-rowed, was obtained from selected heads picked carefully by hand, the largest and plumpest being chosen.

Among the varieties tested this year are the following hybrid sorts, all of which have been produced at the experimental farms:—Sixteen two-rowed barleys: Beaver, Bolton, Gordon, Jarvis, Clifford, Harvey, Dunham, Victor, Nepean, Fulton, Sidney, Logan, Pacer, Leslie, Monck and Rigid, and twenty-one six-rowed sorts, namely : Pioneer, Royal, Argyle, Summit, Albert, Vanguard, Claude, Surprise, Success, Nugent, Trooper, Mansfield, Stella, Garfield, Empire, Phœnix, Yale, Brome, Parkin, Munro and Lytton. The last four named are new hybrids which have been introduced this year. The following is their parentage :—

No. 18. Parkin Beardless—Royal, six-rowed bearded female ; Succcss, six-rowed beardless male.

No. 19. Munro Bearded—Royal, six-rowed bearded female; Success, six-rowed beardless male.

No. 20. Lytton—Royal, six-rowed female; Beaver, two-rowed male.

No. 21. Pelham—Royal, six-rowed female; Beaver, two-rowed male.

Royal, the female parent of Parkin and Munro, is a hybrid between a two-rowed barley, known as Swedish, and a plump six-rowed variety, known as Baxter. Success is a beardless barley. One of the crosses, Parkin, is beardless, like the male parent; the other is bearded and resembles Royal.

In the third case, Lytton is a cross with Royal six-rowed and Beaver two-rowed. Beaver was one of the earlier hybrids, the result of a cross between a two-rowed sort (Swedish) and a six-rowed Baxter. In this case, although in parentage it is two-thirds two-rowed, this barley is, nevertheless, a six-rowed sort. Pelham is a two-rowed sort. The three parents of these hybrids have been very productive.

Nos. 18 and 19 are crosses which were made by the present Horticulturist of the Central Experimental Farm, Mr. W. T. Macoun, in 1895. Nos. 20 and 21 are the work of Dr. C. E. Saunders, in 1896.

Two-Rowed Barley—Test of Varieties.

	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs	
1	Canadian Thorpe	Aug.	7	98	35—38	Very stiff	3—4	58	16	50	Slightly.
2	French Chevalier	"	6	97	33—36	Weak	3¼—4½	56	32	48	Badly.
3	Beaver	"	6	97	35—38	"	3—3¾	54	8	49¼	"
4	Bolton	"	4	95	33—36	Stiff	3—3¾	52	24	51¼	Slightly.
5	Danish Chevalier	"	6	97	33—36	Weak	3¼—4	51	32	49	Considerably.
6	Gordon	"	6	97	40—43	Stiff	3—3½	50	40	49¼	Slightly.
7	Jarvis	"	6	97	39—42	"	3—4	50	20	50	"
8	Newton	"	8	99	38—41	"	3—3¾	50	..	50¼	Considerably.
9	Clifford	"	6	97	38—41	"	3—4	50	..	49	Slightly.
10	Harvey	"	4	95	40—43	"	3—3¾	50	..	50	"
11	Dunham	"	8	99	40—43	"	3¼—4¼	49	8	48½	"
12	Victor	"	6	97	40—43	Medium	3¼—4	49	8	48½	Considerably.
13	Nepean	"	8	99	40—44	"	3—4	49	8	50	Slightly.
14	Fulton	"	8	99	40—43	Stiff	3—3¾	47	44	48	"
15	Sidney	"	4	95	34—38	"	3—3¾	45	..	50	"
16	Logan	"	8	99	39—42	Medium	3—4	43	16	48¾	"
17	Pacer	"	4	95	40—43	Stiff	3—3¾	43	16	50	"
18	Pelham	"	6	97	32—35	Medium	3¼—4¼	42	24	48¾	Considerably.
19	Leslie	"	6	97	35—38	Stiff	3—4	40	40	44	Slightly.
20	Kinver Chevalier	"	6	97	33—36	Weak	3—4	37	44	44	Badly.
21	Monck	"	8	99	36—40	Stiff	3—3¾	35	40	51	Considerably.
22	Improved Thanet	"	10	101	35—38	Weak	3¼—4¼	30	40	44	Badly.
23	Rigid	"	9	100	39—42	"	3¼—4¼	29	8	49¾	Considerably.
24	Prize Prolific	"	14	105	32—35	"	3—4	26	46	46	Badly.

Six-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs	
1	Mensury...........	Aug.	3	94	36—39	Stiff......	2¾—3¾	60	..	48	Slightly.
2	Pioneer............	″	3	94	37—40	″	2½—3¼	60	..	45½	″
3	Common...........	July	31	91	31—34	Medium..	2 —3	59	8	48	″
4	Salzer's Silver King.	Aug.	7	98	36—38	Stiff ...	3 —3¾	58	16	46½	″
5	Royal..............	″	2	93	30—33	Medium..	2 —2¾	58	8	47	″
6	Argyle.............	″	3	94	35—38	Stiff	2¼—3½	56	32	48	″
7	Odessa.......... ..	″	2	93	33—36	Medium..	2½—3	55	..	47	″
8	Petschora	July	31	91	33—35	″ .	3 —3½	54	8	44	Considerably.
9	Summit	Aug.	4	95	31—34	Weak	2 —3	54	8	48½	″
10	Albert	″	3	94	35—38	Stiff......	2 —3	53	16	49½	″
11	Vanguard..........	″	1	92	32—34	″	2 —3¼	52	44	46	Slightly.
12	Oderbruch........ ...	″	3	94	34—37	Weak ...	2½—3¼	52	24	48½	Considerably.
13	Claude.............	″	3	94	33—36	Stiff......	2¼—3¼	51	32	45½	Slightly.
14	Surprise..... :.....	″	4	95	28—31	Weak	2 —3	51	32	47¾	Considerably.
15	Success	July	28	88	29—31	Medium..	2 —2½	50	40	45	Slightly.
16	Parkin............	″	31	91	28—30	Weak	2 — 2½	50	40	46	Considerably.
17	Munro	″	31	91	30—32	″	2 —2¾	50	40	48	″
18	Nugent	Aug.	1	92	36—40	Stiff.....	2¾—3½	50	..	48	Slightly.
19	Blue Short Head ...	″	8	99	29—32	″	2 —2¼	50	..	43	Considerably.
20	Hulless Black	″	1	92	28—30	Weak	1½—2	48	36	60½	Slightly.
21	Trooper	″	2	93	34—37	Medium..	2½—3¼	47	4	49	″
22	Lytton............	″	2	93	29—32	″ .	2¼—3¼	47	4	....	″
23	Excelsior	″	4	95	35—38	Stiff......	2 —3	46	32	43½	Considerably.
24	Champion..........	″	1	92	35—37	″	2½—3¼	45	40	43¾	Slightly.
25	Rennie's Improved..	″	1	92	33—36	Medium. .	2½—3	45	20	45	″
26	Mansfield	″	2	93	37—40	″ .	2½—3¼	45	..	45	″
27	Stella	″	1	92	32—34	Stiff	2 —3	43	36	45¾	″
28	Garfield	″	4	95	35—38	″	2½—3	43	36	47¾	″
29	Empire	″	2	93	34—37	″	2 —2¾	43	36	49¼	″
30	Blue Long Head ...	July	31	91	33—36	Weak	2½—3	43	16	44	Badly.
31	Baxter.......	Aug.	2	93	34—37	Medium. .	2½—3¼	41	32	47	Considerably.
32	Phœnix	″	1	92	33—36	Stiff......	2½—3	41	32	43½	Slightly.
33	Yale.	″	7	98	33—36	Medium..	2¼—3¼	41	32	45½	Considerably.
34	Brome.....	″	3	94	33—36	″	2½—3	40	40	46½	″
35	Hulless' White . . .	″	1	92	30—33	Weak	2 —2½	39	8	53	Slightly.

BARLEY GROWN FROM SCREENED SEED.

While all the uniform trial plots of barley were grown, as already stated, from seed obtained from carefully selected heads, the seed of the following ten varieties was not from selected heads. After the barley plots were threshed, the grain for this purpose was passed through the fanning mill to take out the small kernels, and the clean, plump seed remaining was saved.

Six of these varieties were six-rowed and four were two-rowed, and the following are the results. It will be seen that in every instance but one the seed from selected heads has given the larger crops, the increase per acre varying from 40 pounds to 8 bushels and 40 pounds. The one exception was a two-rowed sort, the Danish Chevalier, which gave a crop of 2 bushels 24 pounds less per acre from the selected heads. These were all sown on the same day as the uniform trial plots, May 1; the plots were adjoining, with similar soil and similarly treated, the size in each case being one-fortieth of an acre.

RESULTS of sowing Screened Seed compared with Selected.

Number	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	From Screened Seed. — Yield per Acre.		From Selected Heads. — Yield per Acre.	
	Six-rowed.			Inches.		Inches.	Bush.	Lbs.	Bush.	Lbs.
1	Mensury	Aug. 3	....	36 to 39	Stiff	$2\frac{1}{2}$ to $3\frac{1}{2}$	56	32	60	..
2	Odessa	" 2	....	33 to 36	"	2 to 3	50	40	55	..
3	Royal	" 2	....	30 to 33	Medium	2 to $2\frac{1}{2}$	50	..	58	8
4	Petschora	July 31	....	33 to 35	"	$2\frac{1}{2}$ to 3	49	8	54	8
5	Champion	Aug. 1	....	35 to 37	Stiff	2 to 3	45	..	45	40
6	Trooper	" 4	....	32 to 35	"	2 to 3	43	16	47	4
	Two-rowed.									
1	Danish Chevalier	Aug. 6	....	33 to 36	Weak	$3\frac{1}{4}$ to 4	54	8	51	32
2	Beaver	" 6	....	34 to 37	"	3 to $3\frac{1}{2}$	50	..	54	8
3	Canadian Thorpe	" 7	....	35 to 38	Stiff	$2\frac{3}{4}$ to $3\frac{1}{4}$	49	28	58	16
4	Sidney	" 4	....	34 to 38	"	3 to $3\frac{1}{2}$	43	16	45	..

FORMALIN AND MASSEL POWDER AS PREVENTIVES OF SMUT IN OATS AND BARLEY.

Three varieties of grain were used in this experiment, viz.: Doncaster Prize oats and Odessa and Canadian Thorpe barleys. These were all sown on May 23, in plots 33 feet long, in rows 9 inches apart; four rows in each test, the heads of which were counted when the smut was fully advanced. The grain used for seed in each case was quite smutty.

OATS.

Name of Variety.	How Treated.	Preventive used.	Good Heads.	Smutty Heads.
Doncaster Prize	Soaked 1 hour	Formalin $4\frac{1}{2}$ ounces to 10 gallons water	2,612	21
"	" 15 minutes	" $4\frac{1}{4}$ " "	2,632	14
"	" 5 "	" $4\frac{1}{4}$ " "	2,581	15
"	Sprinkled	" 9 " "	2,602	19
"	Untreated	....	2,642	28
"	Soaked 10 minutes	Massel powder with lime	2,592	14

BARLEY.

Name of Variety.	How Treated.	Preventive used.	Good Heads.	Smutty Heads.
Odessa	Soaked 1 hour	Formalin, $4\frac{1}{2}$ ounces to 10 gallons water	2,701	22
"	" 15 minutes	" $4\frac{1}{2}$ " "	2,642	18
"	" 5 "	" $4\frac{1}{2}$ " "	2,706	17
"	Sprinkled	" 9 " "	2,726	24
"	Untreated	....	2,742	31
"	Soaked 10 minutes	Massel powder with lime	2,638	27
Canadian Thorpe	" 1 hour	Formalin, $4\frac{1}{2}$ ounces to 10 gallons water	2,289	12
"	" 15 minutes	" $4\frac{1}{2}$ " "	2,309	16
"	" 5 "	" $4\frac{1}{2}$ " "	2,823	14
"	Sprinkled	" 9 " "	2,532	16
"	Untreated	....	2,621	26
"	Soaked 10 minutes	Massel powder with lime	2,298	14

EXPERIMENTS WITH FALL WHEAT.

The number of varieties of fall wheat under trial during the past season was twenty-two. Their names were as follows:—Poole, Gold Coin, Dawson's Golden Chaff, Bonnell, Standard, Winter King, Early Ripe, Red Velvet Chaff, Jones' Winter Fife, Pride of Illinois, American Bronze, Early Red Clawson, Russian Amber, Long Berry Red, Early Gennessee Giant, Buda Pesth, Reliable, Golden Cross, Imperial Amber, Tasmania Red, Egyptian and Velvet Chaff. These were all sown in plots of one-fortieth acre each, on September 13, 1899. The winter was unfavourable for this crop, and in the spring of 1900 all the plots were found to be so badly winter-killed that they were not worth leaving, and were ploughed under.

EXPERIMENTS WITH SPRING WHEAT.

Seventy-two varieties of spring wheat have been tested in the uniform trial plots during the past season. The soil was a heavy sandy loam of fairly good quality, slightly mixed with clay, which received a dressing of about 15 tons of barn-yard manure per acre in the spring of 1897. No fertilizer has been applied since. The previous crop was hay. The land was ploughed late in the autumn to the depth of about seven inches, and left in that state until the following spring, when it was harrowed twice with the disc-harrow and twice with the smoothing harrow before sowing. The size of the plots was one-fortieth acre each; they were all sown on April 28, using at the rate of one bushel and a half of seed per acre.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Bush	Lbs.	Lbs.	
1	Huron	Aug. 13	107	43—47	Stiff	3 —3¾	Bearded	38	40	60¾	Slightly.
2	Wellman's Fife	" 14	108	45—49	"	3¼—4	Beardless	35	20	58	"
3	Blenheim	" 13	107	40—43	"	2½—3½	Bearded	34	40	60½	"
4	Preston	" 11	105	42—45	"	3 —4	"	34	..	60¾	"
5	Laurel	" 15	109	46—50	"	3 —4	Beardless	33	40	59	"
6	Colorado	" 9	103	40—43	"	2½—3½	Bearded	33	20	61	"
7	Captor	" 9	103	38—41	"	3 —3¾	Beardless	32	40	59½	"
8	Red Fern	" 13	107	40—43	"	3 —3¾	Bearded	32	40	61	"
9	White Russian	" 14	108	45—49	"	3¼—4	Beardless	32	40	60	"
10	Weldon	" 10	104	37—40	"	3 —3¾	"	32	40	61	"
11	Red Fife	" 16	110	38—42	"	3 —3½	"	32	..	59¾	"
12	Pringle's Champlain	" 13	107	38—42	"	3 —4	Bearded	32	..	61¼	"
13	Admiral	" 12	106	40—45	"	2½—3½	Beardless	31	20	58¾	"
14	Dion's	" 13	107	40—43	"	3 —4	Bearded	31	20	61½	"
15	Crown	" 12	106	40—44	"	2¾—3¾	"	31	20	60½	"
16	Roumanian	" 17	111	43—47	"	2 —3¼	"	31	20	62½	Considerably.
17	Stanley	" 10	104	40—43	"	3 —4	Beardless	30	40	59	"
18	Harold	" 4	98	33—35	Weak	2 —2¾	Bearded	30	40	58½	"
19	Clyde	" 13	107	38—42	Stiff	3 —3½	Beardless	30	40	60	Slightly.
20	Plumper	" 7	101	37—40	"	2½—3¼	Bearded	30	20	61	Considerably.
21	Monarch	" 15	109	42—46	"	3 —4	Beardless	30	..	58½	Slightly.
22	Beauty	" 13	107	42—46	"	3 —4	"	30	..	59	"
23	Crawford	" 9	103	40—43	Medium	3 —3¾	"	30	..	59	"
24	No. 19 (Australian)	" 16	110	43—47	Stiff	3 —3¾	"	30	..	59½	"
25	Percy	" 11	105	42—45	"	3 —3¾	"	30	..	60½	"
26	No. 9 (Australian)	" 16	110	43—47	"	2½—3½	"	30	..	59½	Considerably.
27	Byron	" 11	105	35—40	Weak	2½—3½	Bearded	30	..	59	"
28	Chester	" 10	104	40—44	Stiff	3 —3½	Beardless	30	..	....	"

SPRING WHEAT—TEST OF VARIETIES—*Continued.*

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Bush.	Lbs.	Lbs.	
29	Cartier	Aug. 10	104	35—38	Weak	2½—3½	Bearded	29	40	60¾	Considerably.
30	Goose	" 17	111	43—47	Stiff	2 —3¼	"	29	20	62¾	"
31	Advance	" 12	106	42—45	"	3 —4	"	29	20	60¾	Slightly.
32	Fraser	" 9	103	38—42	"	2½—3¼	"	29	20	59¾	Considerably.
33	No. 25 (Australian)	" 10	104	40—45	"	3 —3½	Beardless	28	40	59	Slightly.
34	Blair	" 9	103	39—42	"	3 —3½	Bearded	28	40	60½	Considerably.
35	No. 10 (Australian)	" 16	110	44—48	"	3 —3½	Beardless	28	..	57	Slightly.
36	No. 23 (Australian)	" 14	108	42—46	"	3 —3¾	"	28	..	....	"
37	White Fife	" 14	108	38—42	"	3 —3½	"	28	..	59¾	"
38	Black Sea	" 8	102	40—44	"	3¼—4¼	Bearded	27	40	59	Considerably.
39	Cassel	" 15	109	36—39	Medium	3 —3¾	Beardless	27	40	60	"
40	Alpha	" 13	107	40—44	Stiff	3 —3½	"	27	20	60¾	Slightly.
41	No. 27 (Australian)	" 15	109	40—42	"	3 —4	"	27	20	58½	"
42	White Connell	" 16	110	46—50	"	3 —3½	"	27	..	59	"
43	Boyle	" 15	109	38—42	"	3 —3¾	"	27	..	60	"
44	Rio Grande	" 15	109	44—48	Medium	3 —3¾	Bearded	26	40	60½	"
45	Beaudry	" 12	106	38—42	Weak	2¼—3¼	"	26	40	59½	Badly.
46	Norval	" 7	101	34—37	Stiff	3 —3¾	"	26	40	60	Considerably.
47	Mason	" 10	104	36—39	Weak	3 —3¾	Beardless	26	40	60	Badly.
48	Progress	" 13	107	44—47	Stiff	3 —3¼	"	26	20	60½	Slightly.
49	Ebert	" 7	101	40—43	"	3 —3½	"	26	20	60½	Considerably.
50	Florence	" 13	107	35—39	Medium	2½—3½	Bearded	26	..	59	"
51	Herisson Bearded	" 13	107	35—40	"	2 —2¾	"	26	..	62	"
52	Robins' Rust Proof	" 14	108	38—42	Weak	3 —3½	Beardless	26	..	57½	Badly.
53	Vernon	" 13	107	38—42	Stiff	3 —3¾	Bearded	26	..	59½	Slightly.
54	Powell	" 15	109	40—45	"	3 —3½	Beardless	26	..	60	"
55	Hungarian	" 16	110	42—46	Medium	3 —3¾	Bearded	25	40	61¾	Considerably.
56	Early Riga	" 6	100	34—37	Weak	2½—3½	Beardless	25	20	59	Badly.
57	White Chaff, Campbell's	" 10	104	40—45	Stiff	3 —3½	"	25	20	56	Slightly.
58	Bishop	" 10	104	40—43	Weak	3 —3½	"	25	20	59½	Badly.
59	Rideau	" 13	107	38—42	Stiff	2½—3½	"	25	20	57	Slightly.
60	Duff No. 13 (Australian)	" 16	110	43—46	"	3 —3¾	"	25	..	57	"
61	Dawn	" 11	105	40—44	"	3 —3¾	"	24	40	59	Considerably.
62	Ladoga	" 7	161	36—40	"	2¾—3½	Bearded	24	..	59	Slightly.
63	Japanese	" 8	102	34—37	Weak	2½—3	"	24	..	58	Considerably.
64	Angus	" 13	107	38—42	Medium	3 —3¾	Beardless	22	40	59½	"
65	Red Swedish	" 10	104	40—45	Weak	3 —3¾	Bearded	22	..	57½	Badly.
66	Countess	" 11	105	40—45	Stiff	2½—3½	Beardless	22	..	60	Considerably.
67	Essex	" 16	110	45—49	Weak	3 —4	"	21	20	56	"
68	Dawson	" 16	110	45—49	"	3 —3¾	"	20	40	56	"
69	Dufferin	" 11	105	42—46	Medium	2¾—3½	Bearded	19	20	58	Badly.
70	Benton	" 16	110	37—40	Weak	3 —3½	Beardless	19	..	57	"
71	Hastings	" 14	108	36—40	"	2 —3	"	18	..	59	"
72	Polonian	" 17	111	36—40	Stiff	4 —5	....	13	20	53	"

In the foregoing list there are included forty-two of the new cross-bred sorts, which have been originated at the experimental farms. The names of these cross-bred sorts are:—Huron, Blenheim, Preston, Laurel, Captor, Weldon, Admiral, Crown, Stanley, Harold, Clyde, Plumper, Beauty, Crawford, Percy, Byron, Chester, Cartier, Advance, Fraser, Blair, Cassel, Alpha, Boyle, Norval, Mason, Progress, Ebert, Florence, Vernon, Powell, Early Riga, Bishop, Rideau, Dawn, Angus, Countess, Essex, Dawson, Dufferin, Benton, Hastings. The origin and parentage of all these, excepting three, will be found in the annual reports for 1896-7 and 1897-8. The three now added are the following:—

No. 43, Boyle, Beardless—Red Fife, female ; Ladoga, male.

No. 44, Florence, Bearded—Alpha, female ; Hard Red Calcutta, male.

No. 45, Powell, Beardless—Red Fife, female ; Hard Red Calcutta, male.

Of these results in cross-fertilizing, No. 43 was originated by the Director at the Central Experimental Farm in 1890, and 44 and 45 by Dr. A. P. Saunders in 1892, No. 44 at the Experimental Farm at Agassiz, B.C., and No. 45 at the Experimental Farm at Indian Head, N.W.T.

SPRING WHEAT GROWN FROM SCREENED SEED.

All the uniform trial plots of spring wheat were grown from seed obtained from carefully selected heads; the seed of the following eight varieties was not from selected heads. After the wheat plots were threshed, the grain for this purpose was passed through the fanning mill to separate the small kernels, and the clean plump seed remaining was saved. These eight varieties were all sown on plots of one-fortieth acre each, adjoining the uniform test plots; the soil and preparation was the same, and they were sown on the same day, April 28.

Results of sowing Screened Seed compared with Selected Heads.

Number.	Name of Variety.	From Screened Seed. — Yield per Acre		Weight per Bushel.	From Selected Heads — Yield per Acre		Weight per Bushel.
		Bush.	Lbs.	Lbs.	Bush.	Lbs.	Lbs.
1	White Russian	32	40	59	32	40	60
2	Preston	32	..	61	34	..	$60\frac{3}{4}$
3	Wellman's Fife	32	..	$60\frac{1}{2}$	35	20	58
4	Colorado	29	..	$59\frac{1}{4}$	33	20	61
5	White Fife	28	..	60	28	..	$59\frac{3}{4}$
6	Stanley	27	20	$59\frac{3}{4}$	30	40	59
7	Percy	26	40	$59\frac{3}{4}$	30	..	$60\frac{1}{2}$
8	Red Fife	25	20	$60\frac{1}{2}$	32	..	$59\frac{3}{4}$

It will be seen that the seed from selected heads has given larger crops in every instance excepting two, White Russian and White Fife, where the yield was the same.

EXPERIMENTS WITH PEASE.

Fifty-six varieties of pease have been under trial in the uniform test plots during the past season. The ground chosen for this test was adjoining that of the uniform trial plots of oats, the soil was similar and the preparation and treatment of the land the same. The previous crop was mangels and sugar beets. The size of the plots was one-fortieth acre each, and all were sown on May 7, at the rate of 2 or $2\frac{1}{2}$ bushels per acre, according to the size of the pea.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per Bushel.
					Inches.	Inches.	Bush.	Lbs.	Lbs.
1	Golden Vine	Aug. 24	109	Strong	58–64	1½—2	40	..	63
2	Fergus	" 27	112	"	60–68	1½—2	38	40	62½
3	Paragon	" 22	107	Medium	48–54	2—2¾	36	..	63½
4	Early Britain	" 21	106	"	52–58	2½—2¾	35	20	59½
5	Duke	" 27	112	Strong	54–60	1½—2¼	35	20	62
6	Fenton	" 26	111	"	60–70	1½—2¼	33	20	60
7	Mummy	" 25	110	Medium	50–56	1½—2¼	33	20	62
8	Harrison's Glory	" 20	105	"	40–46	2—3	32	40	61
9	Prince	" 27	112	Strong	60–66	1¾—2¼	32	..	62
10	Chancellor	" 18	103	"	60–70	2—2½	31	40	62½
11	New Potter	" 27	112	"	60–70	2—2½	30	40	61½
12	Lanark	" 25	110	Medium	55–62	1¾—2¼	30	40	61½
13	Kent	" 25	110	Strong	62–70	1¾—2¼	30	20	62
14	Oddfellow	" 18	103	Medium	40–46	1½—2½	30	..	65
15	Arthur	" 18	103	Strong	40–45	2—3	30	..	63½
16	Dover	" 29	114	"	58–64	2—2½	29	20	63½
17	Prussian Blue	" 27	112	"	55–62	1¾—2½	28	40	62½
18	Wisconsin Blue	" 27	112	Medium	56–62	1½—2¼	28	40	62
19	White Wonder	" 18	103	"	30–36	2—2½	28	..	62½
20	Elephant Blue	" 25	110	Strong	50–56	1¾—2¼	28	..	62
21	Bright	" 29	114	"	58–64	1¾—2¼	27	20	62
22	Large White Marrowfat	" 28	113	"	60–70	2—2½	27	20	62½
23	Nelson	" 20	105	"	45–50	2½—2¾	27	..	62¾
24	English Gray	" 21	106	"	50–56	2—2¾	26	40	60
25	Canadian Beauty	" 23	108	"	55–60	2—3	26	..	63
26	Black-eyed Marrowfat	" 27	112	"	60–66	2—2½	26	..	61
27	Picton	" 25	110	"	55–60	2¼—2¾	26	..	62
28	Perth	" 22	107	Medium	40–46	2—3	25	40	61½
29	Creeper	" 23	108	"	50–58	1½—2¼	25	20	62½
30	Daniel O'Rourke	" 20	105	"	45–50	1½—2	25	20	62½
31	German White	" 20	105	Strong	50–56	2—2¾	25	20	61½
32	Pearl	" 26	111	"	50–56	2—2¾	25	20	62
33	Centennial	" 27	112	"	55–60	1¾—2¼	25	20	62½
34	Alma	" 23	108	"	50–56	2—2½	25	..	63
35	Gregory	" 20	105	"	55–62	2—2½	24	40	62
36	King	" 25	110	"	56–62	1½—2	24	..	62½
37	Pride	" 22	107	Weak	40–46	1½—2	24	..	62½
38	Agnes	" 22	107	Strong	58–64	2—3	24	..	63
39	Archer	" 27	112	"	65–75	1½—2¼	24	..	63
40	Crown	" 25	110	Medium	55–60	1¼—2	23	20	62½
41	Vincent	" 25	110	"	46–54	1¾—2¼	23	20	61
42	Victoria	" 20	105	Strong	50–60	2—2¾	23	20	62¼
43	Macoun	" 22	107	"	52–60	2—2¾	23	20	62
44	Trilby	" 24	109	"	58–64	1½—2	22	40	60½
45	Carleton	" 26	111	"	60–70	1¾—2¼	22	..	62
46	Prince Albert	" 26	111	"	58–64	1½—2	22	..	62
47	Mackay	" 24	109	"	50–56	2—2½	22	..	62
48	Herald	" 27	112	"	54–60	2—2½	22	..	63
49	Cooper	" 20	105	Medium	60–65	2—2½	20	40	62½
50	French Canner	" 18	103	"	45–50	2—2¾	20	40	61¼
51	Bruce	" 27	112	"	50–58	1½—2¼	20	..	62
52	Elder	" 21	106	Strong	48–50	1¾—2½	19	20	62
53	Elliot	" 25	110	"	55–65	2—2¾	19	20	62
54	Bedford	" 24	109	"	58–65	1¾—2½	18	..	62½
55	Chelsea	" 25	110	"	60–66	1¾—2¼	18	..	62½
56	Multiplier	" 27	112	"	62–68	1½—2	17	20	62

The foregoing list includes the following thirty cross-bred sorts, all of which have been originated at the experimental farms :—Fergus, Duke, Fenton, Prince, Lanark, Kent, Arthur, Dover, Bright, Nelson, Picton, Perth, Pearl, Alma, Gregory, King, Agnes, Archer, Vincent, Macoun, Trilby, Carleton, Mackay, Herald, Cooper, Bruce, Elder, Elliot, Bedford and Chelsea.

1. Corn Harvester at work.
2. Group of Steers for feeding.
3. Cutting ensilage and filling silo with blower.
4. Harvesting Banner Oats.

EXPERIMENTS WITH INDIAN CORN.

Thirty-four varieties of Indian corn were tested during the season of 1900, side by side, on fairly uniform land. The soil was a sandy loam of fairly good quality, which received a dressing of barn-yard manure, about twelve tons to the acre, during the winter of 1899-1900. This was placed on the frozen land fresh from the barn-yard, in small heaps of about one-third of a cart-load each, and spread and ploughed under in the spring. The previous crop was barley. The land was gang-ploughed shallow shortly after harvest to start weed seeds and shed grain, and ploughed again in the autumn seven or eight inches deep. In the spring of 1900, after the manure was ploughed under, it was harrowed twice with the smoothing harrow before sowing. The corn was sown with the seed drill, in rows three feet apart ; when the plants were from five to seven inches high they were thinned so as to leave them from six to eight inches apart in the rows.

The varieties were all sown on May 25, and were cut for ensilage on September 12. The yield per acre has been calculated from the weight of the crop cut from two rows, each 66 feet long.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in rows.	
			Inches.		September 12.	Tons.	Lbs.
1	Thoroughbred White Flint	Very strong.	100 to 112	Very leafy	Late milk	24	1,280
2	Red Cob Ensilage	"	108 to 120	Leafy	Early milk	23	1,740
3	Early Mastodon	Strong	100 to 120	Very leafy	Late milk	23	1,300
4	Giant Prolific Ensilage	"	96 to 112	Leafy	Early milk	23	1,300
5	Superior Fodder	Very strong.	108 to 120	"	"	23	640
6	Salzer's All Gold	Strong	96 to 108	"	Late milk	23	310
7	Champion White Pearl	"	110 to 120	Very leafy	"	23	200
8	Mammoth Cuban	"	90 to 102	Leafy	"	23	200
9	Longfellow	"	84 to 96	"	"	22	110
10	Angel of Midnight	"	86 to 96	"	Glazed	22	
11	Canada White Flint	"	90 to 100	"	Late milk	22	
12	White Cap Yellow Dent	"	86 to 100	"	Glazed	21	1,780
13	Cloud's Early Yellow	"	120 to 133	"	Late milk	21	900
14	Mammoth Eight-rowed Flint	"	84 to 102	"	Doughy	21	240
15	Pride of the North	"	96 to 118		Late milk	21	20
16	Selected Leaming,	"	112 to 124	Leafy	"	20	40
17	North Dakota White	"	90 to 102	"	"	20	40
18	Compton's Early	"	84 to 96	"	Glazed	19	500
19	Early Butler	"	90 to 102	Fairly leafy.	"	19	280
20	Pearce's Prolific	"	87 to 100	Leafy	"	18	1,400
21	King of the Earliest	"	84 to 96	"	"	18	850
22	Sanford,	"	84 to 96	"	"	17	1,910
23	Evergreen Sugar	"	84 to 96	Fairly leafy.	Late milk	17	1,200
24	Extra Early Huron	"	84 to 96	Leafy	Glazed	17	100
25	Early Giant	Medium	68 to 80	"	"	15	1,900
26	Early Yellow Long-eared	"	72 to 84	"	Doughy	13	1,280
27	Kendall's Giant	"	60 to 72	Fairly leafy.	Glazed	13	180
28	Country Gentleman,	"	80 to 90	"	Late milk	12	1,520
29	Mitchell's Extra Early	"	60 to 72	"	Ripe	12	310
30	Yellow Six Weeks Extra	"	60 to 72	"	"	11	110
31	Extra Early Szekley	"	68 to 80	"	"	10	1,780
32	Yellow Dakota Flint	"	60 to 72	"	"	10	1,780
33	Salzer's Earliest Ripe	"	60 to 72	"	"	9	1,800
34	Extra Early Corey	Weak	55 to 67	"	"	9	1,580

INDIAN CORN PLANTED AT DIFFERENT DISTANCES.

Three varieties of Indian corn were chosen for this test, the Longfellow, Selected Leaming and Champion White Pearl. They were sown in rows, at four different distances, viz., 21, 28, 35 and 42 inches apart. The soil was a sandy loam of fair quality; the previous crop was barley. The land was gang-ploughed shortly after harvest, very shallow, to start weed seeds and shed grain, and ploughed again later in the autumn, about seven inches deep. During the winter of 1899-1900, this land received a dressing of barn-yard manure, fresh from the barn-yard, which was distributed over the land in small piles of about one-third of a cart-load each. In the spring of 1900, the manure was spread and ploughed under about six inches deep, and the land harrowed twice before sowing. The corn was sown with the seed-drill on May 25, and cut for ensilage on September 12. Four rows were sown in each case, and the yield per acre has been estimated from the weight obtained from the two inside rows, 66 feet long.

Name of Variety.	Width of Row.	Character of Growth.	Height when Cut.	Condition when Cut.	Weight per Acre.	
	Inches.		Inches.		Tons.	Lbs.
Selected Leaming	21	Strong	74 to 84	Early milk	30	536
"	28	"	74 " 84	"	27	1,836
"	35	"	80 " 90	Late milk	21	1,780
"	42	Very strong	80 " 90	"	19	496
Longfellow	21	Strong	80 " 92	Early milk	18	1,600
"	28	"	80 " 92	"	18	1,929
"	35	"	84 " 96	Late milk	22	1,100
"	42	Very strong	80 " 94	"	18	1.784
Champion White Pearl	21	Strong	108 " 120	Early milk	19	1.480
" "	28	"	108 " 120	"	20	1,018
" "	35	"	112 " 124	Late milk	23	200
" "	42	Very strong	112 " 124	"	21	48

EXPERIMENTS WITH TURNIPS.

Twenty-seven varieties of turnips were on trial during the past season, all sown side by side on similar land. The soil was a heavy sandy loam of good quality, more or less mixed with clay. The previous crop was experimental plots of wheat and barley. During the winter of 1899 and 1900 this land received a dressing of about 12 tons of fresh barn-yard manure per acre, which was placed on the frozen ground in small piles of about a third of a cart-load each to prevent fermentation. This was spread in the spring, ploughed under about six inches deep, harrowed with the smoothing harrow, and cultivated before sowing. The land was then made up in drills two feet apart, and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. The seed was sown at the rate of three pounds per acre. Two sowings were made of each sort, the first on May 16, the second on May 30. They were also pulled on two different dates. The first pulling was on October 16 and the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row 66 feet in length.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling, October 16.		Yield per Acre from 2nd Sowing, 1st Pulling, October 16.		Yield per Acre from 1st Sowing, 2nd Pulling, November 6.		Yield per Acre from 2nd Sowing, 2nd Pulling, November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Carter's Elephant	42	1,800	25	1,150	45	1,080	29	410
2	Skirvings	37	1,240	31	865	39	210	32	680
3	Champion Purple Top	36	1,590	26	925	35	1,445	26	635
4	West Norfolk Red Top	36	930	29	1,400	37	1,570	30	1,545
5	Sutton's Champion	36	105	34	1,300	36	1,920	34	805
6	Monarch	35	1,940	18	795	39	1,530	23	1,520
7	Magnum Bonum	35	1,280	30	1,710	33	1,320	36	270
8	Drummond Purple Top	35	620	24	1,830	41	1,160	29	740
9	Shamrock Purple Top	33	825	31	37	34	310	29	1,730
10	Turnip seed from Whitman Butler, Kelly's Cove, N.S.	33	660	34	310				
11	Perfection Swede	33	825	28	925	37	580	28	1,750
12	Kangaroo	33	330	29	575	33	1,980	32	845
13	Elephant's Master	32	1,835	30	1,050	30	720	29	905
14	Purple Top Swede	32	1,340	28	760	33	1,320	30	390
15	Hall's Westbury	32	1,010	23	530	38	65	32	350
16	Champion Purple Top	32	680	30	1,050	33	1,485	32	185
17	East Lothian	32	350	21	240	35	620	29	80
18	Hartley's Bronze Top	31	1,360	24	1,170	34	970	32	20
19	Mammoth Clyde	31	1,195	26	1,790	36	1,920	24	510
20	New Arctic	31	1,030	24	180	35	620	25	1,315
21	Marquis of Lorne	31	1,030	26	965	32	1,340	27	285
22	Jumbo	31	370	27	1,935	34	970	28	595
23	Webb's Imperial	30	390	26	1,130	35	1,610	27	1,440
24	Prize Winner	29	80	22	1,375	31	1,855	24	840
25	Prize Purple Top	28	1,750	23	860	28	430	26	800
26	Halewood's Bronze Top	28	100	14	1,370	33	1,650	23	530
27	Bangholm Selected	27	1,440	24	510	39	1,860	29	410
28	Giant King	24	180	21	900	31	370	17	1,310

	Tons.	Lbs.
The average of the 1st sowing, 1st pulling was	32	1,541
" 2nd " "	26	430
" 1st " 2nd "	35	1,219
" 2nd " "	28	1,218

INCREASE IN CROP OF TURNIPS FROM EARLY SOWING ALSO FROM LATE PULLING.

The results here given emphasize the advantages of early sowing. The average yield of turnips from all the varieties from the first sowing and first pulling has exceeded those of the second sowing by 6 tons 1,111 pounds, and in the case of the second pulling made twenty-one days later the larger weight from the earlier sowing is well maintained, the difference being 7 tons 1 pound per acre in favour of early sowing.

The figures given also show that the 21 days of additional time given to the roots to grow between October 16 and November 6 resulted in an average increase in weight in the early sown plots of 2 tons 1,678 pounds per acre, while those later sown increased in weight during the same period 2 tons 788 pounds per acre.

Two acres were sown to fill up the block on the experimental grounds. The soil was clay loam of good quality. The previous crop was experimental plots, wheat, oats, barley. This land received the same fertilizing and treatment as that on which the test of varieties was made. It was cultivated several times in the spring on very sunny days to kill some scutch grass before sowing, it was then made into drills 2 feet apart, and subsequently rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. The variety chosen was Skirvings, the seed was sown at the rate of 3 pounds per acre on June 16 came up June 21, and the roots were pulled November 6. Yield per acre, 25 tons 1,275 pounds, or 854 bushels 35 pounds.

EXPERIMENTS WITH MANGELS.

The number of varieties of mangels under test in 1900 was twenty-two. These were all sown side by side adjoining the turnips ; the land was similar in character and its treatment and preparation was the same. The drills were made up two feet apart and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made of each sort, the first on May 16, the second on May 30. They were also pulled on two different dates, the first pulling was on October 16 and the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row, 66 feet in length.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing, 1st Pulling October 16.		Yield per acre from 2nd Sowing, 1st Pulling October 16.		Yield per acre from 1st Sowing, 2nd Pulling November 6.		Yield per acre from 2nd Sowing, 2nd Pulling November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Canadian Giant	51	630	34	310	51	1,620	34	1,465
2	Giant Yellow Intermediate	49	340	24	1,500	49	835	27	1,770
3	Ward's Large Oval Shaped	47	1,040	33	1,650	46	1,720	35	620
4	Mammoth Long Red	46	400	39	540	40	685	40	520
5	Giant Yellow Half Long	45	1,080	25	1,150	40	1,923	31	1,360
6	Yellow Intermediate	44	440	38	560	45	750	39	870
7	Gate Post	42	480	34	1,300	41	253	33	1,320
8	Half Long Sugar Rosy	42	295	28	430	43	1,120	38	890
9	Champion Yellow Globe	42	150	35	290	43	130	35	1,280
10	Yellow Intermediate	42	150	40	1,510	42	1,470	41	1,160
11	Half Long Sugar White	41	1,820	31	700	33	1,320	39	1,860
12	Prize Mammoth Long Red	41	1,490	33	990	42	150	33	1,650
13	Lion Yellow Intermediate	41	500	40	1,180	40	685	39	1,200
14	Gate Post Yellow	41	500	29	1,400	39	870	30	1,215
15	Giant Yellow Globe	41	170	27	450	41	830	30	1,050
16	Yellow Globe	41	170	37	580	40	1,345	40	1,840
17	Mammoth Oval Shaped	39	210	41	500	41	5	38	1,880
18	Norbitan Giant	37	910	31	1,360	38	1,220	32	1,670
19	Selected Mammoth Long Red	37	250	30	1,050	39	1,860	31	370
20	Golden Fleshed Tankard	36	1,590	31	1,855	37	580	32	680
21	Yellow Fleshed Tankard	31	865	30	60	33	330	31	1,690
22	Warden Orange Globe	31	370	30	60	35	455	31	535

	Tons.	Lbs.
Average of 1st sowing, 1st pulling	41	1,084
" 2nd " 1st "	41	553
" 1st " 2nd "	33	338
" 2nd " 2nd "	35	223

SUMMARY.

In 1898 there was a considerable increase in the crop of mangels from the early sown plots; this year only a small advantage was gained by early sowing. The average of the crops from the first sowing was only 531 pounds per acre above that from the second sowing. At the same time there was a falling off in both instances in the second pulling, probably the result of unfavorable conditions of weather.

EXPERIMENTS WITH CARROTS.

Nineteen varieties of carrots were under test during 1900, all sown side by side adjoining the turnips and mangels. The land was similar in character and its treatment and preparation were the same. The land was made up in drills two feet apart, and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made of each sort, the first on May 16, the second on May 30. They were also pulled on two different dates; the first pulling was on October 16, the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing, 1st Pulling October 16.		Yield per acre from 2nd Sowing, 1st Pulling October 16.		Yield per acre from 1st Sowing, 2nd Pulling November 6.		Yield per acre from 2nd Sowing, 2nd Pulling November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	White Vosges Large Short	38	1,880	27	1,770	39	870	27	1,110
2	New White Intermediate	37	250	31	1,810	35	950	33	330
3	Improved Short White	35	1,280	27	120	41	170	28	1,915
4	Half Long White	33	1,155	27	1,275	37	580	33	1,980
5	Iverson's Champion	32	1,340	26	1,130	37	910	30	1,380
6	Green Top White Orthe	32	915	26	470	33	1,650	26	965
7	Giant White Vosges	31	700	25	1,150	31	1,030	27	450
8	Guerande or Ox-Heart	27	615	23	1,190	30	1,380	29	1,730
9	Yellow Intermediate	26	1,460	24	1,170	27	1,770	27	120
10	Ontario Champion	26	800	24	15	32	515	29	1,730
11	Mammoth White Intermediate	26	140	22	550	35	620	23	1,850
12	Carter's Orange Giant	25	1,810	21	1,560	27	120	24	1,170
13	Half Long Chantenay	25	985	24	1,170	27	615	23	695
14	Early Gem	25	820	22	550	35	290	25	1,480
15	White Belgian	22	380	21	570	22	1,540	22	220
16	Scarlet Intermediate	19	1,270	15	1,185	21	1,230	19	1,930
17	Scarlet Nantes	17	1,805	15	690	18	300	16	1,990
18	Long Orange or Surrey	17	1,805	14	50	21	1,560	17	650
19	Long Scarlet Altringham	17	650	12	1,080	20	590	15	360

	Tons.	Lbs.
Average of 1st sowing, 1st pulling	27	766
" 2nd " 1st "	22	1,763
" 1st " 2nd "	30	668
" 2nd " 2nd "	25	950

INCREASE IN CROP OF CARROTS FROM EARLY SOWING, ALSO FROM LATE PULLING.

With carrots early sowing has been attended with much advantage. The average yield from all the varieties from the first sowing and first pulling was four tons 1,003 pounds more than was harvested from the second sowing.

During the 21 days between the dates of the first and second pullings, the early sown plots gained on an average 2 tons 1,902 pounds per acre, while the roots from the second sowing during the same time made a gain of 2 tons 1,187 pounds per acre.

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested in 1900. They were sown side by side on land adjoining that used for the trial plots of turnips, mangels and carrots ; the soil was similar and the treatment and preparation of the land and the method of sowing were the same. Two sowings were made, the first on May 16, the second on May 30. They were also pulled at two different dates ; the first pulling was on October 16, the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling October 16.		Yield per Acre from 2nd Sowing, 1st Pulling October 16.		Yield per Acre from 1st Sowing, 2nd Pulling November 6.		Yield per Acre from 2nd Sowing, 2nd Pulling November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Danish Improved	42	810	28	430	35	1,280	35	1,940
2	Wanzleben	40	355	31	1,030	40	520	35	455
3	Improved Imperial	38	1,335	25	490	32	1,340	33	330
4	Red Top Sugar..	37	580	26	1,130	36	1,260	31	700
5	Danish Red Top	34	805	31	1,030	35	620	39	1,200
6	Vilmorin's Improved	27	615	22	220	27	1,110	25	1,150

	Tons.	Lbs.
Average of 1st sowing, 1st pulling	36	1,417
" 2nd " 1st "	27	1,055
" 1st " 2nd "	34	1,355
" 2nd " 2nd "	33	963

The increase in crop from the early sowing of sugar beets was very marked this year, the gain amounting to 9 tons 362 pounds per acre. There was a slight decrease in the crop in the second pulling of the early sown plots, but on those later sown the increase was 5 tons 1,908 pounds per acre.

FIELD PLOTS OF POTATOES.

The following field plots of potatoes were included in the land devoted to experimental purposes. The land on which these potatoes were planted was similar throughout, and the preparation and treatment were the same for all. The soil was a light sandy loam. The previous crop was pease. During the winter of 1899 and 1900 it received a dressing of about 12 tons of fresh barn-yard manure per acre, which was placed during the winter on the frozen ground in small piles of about a third of a cart-load each, to prevent fermentation. This was spread in the spring, ploughed under about six inches deep, and harrowed with the smoothing-harrow, then made into drills 2½ feet apart and six inches deep for planting.

No.	Name of Variety.	When Planted.		Came up.		When Dug.		Yield per Acre.	
								Bush.	Lbs.
1	Carmans No. 1	May	23..	June	12..	Sept.	27..	387	44
2	Early Sunrise	"	25..	"	12..	"	28..	257	30
3	Burnaby Seedling	"	25..	"	12..	"	29..	228	43
4	Early Harvest	"	25..	"	12..	October	1 .	327	1
5	*Empire State	"	25..	"	12..	"	1..	226	15
6	†American Wonder	"	25..	"	12..	"	2..	165	47
7	*Everett	"	25..	"	12..	"	2..	221	10
8	Wonder of the World	June	1..	"	17..	"	3..	333	16
9	Early Rose	"	1..	"	17..	"	3..	291	47
10	Seedling 230	"	1..	"	17..	"	3..	428	41
11	Prize Taker	May	28..	"	15..	"	3..	290	24
12	Uncle Sam	"	28..	"	15..	"	3..	313	33
13	Early White Prize	"	28..	"	15..	"	3..	351	34

* Part in low land. † Wet low land lessened the yield.

Number	Name of Variety.	When Planted.	Came Up.	When Dug.	Yield Per Acre.
1	Sir Walter Raleigh	May 28. ..	June 15....	Oct. 3......	325·33
2	Vigorosa	" 28....	" 15....	" 3.....	318·25
3	New Queen	" 28.....	" 15.. .	" 3.....	316·53
4	Honeoye Rose	" 28....	" 15....	" 3	272·34
5	Canadian Beauty	" 28.....	" 15 ...	" 3 ...	453·26
6	Early Andes	" 28.....	" 15....	" 3......	384·39
7	Prolific Rose	" 28.....	" 15....	" 3......	351·32
8	Bovee	" 28.....	" 15....	" 3......	360·42
9	Rochester Rose	" 28.....	" 15....	" 3	255·53

EXPERIMENTS WITH SUNFLOWERS.

A plot covering a quarter of an acre was sown with this crop. The soil was a sandy loam of good quality. The previous crop was oats. After the oat crop was cut the land was gang-ploughed shallow, and later in the autumn it was ploughed to the depth of 7 or 8 inches. During the winter of 1899 and 1900 the land received a dressing of fresh barn-yard manure, about 12 tons per acre. This was placed on the frozen ground in small piles of about one-third cart-load each to prevent fermentation and loss, and spread and ploughed under in the spring of 1900. The land was then harrowed twice with the disc-harrow and three times with the smoothing-harrow, when the seed was sown with the grain drill in rows 3 feet apart, about 3 or 4 pounds of seed being used per acre. Subsequently the plants were thinned out when they were 4 or 5 inches high, so as to leave them from 12 to 15 inches apart in the rows.

The variety tried was Mammoth Russian, black seed. It was sown on May 25, and the heads were cut on September 15 and put in the silo. The plants made a strong growth, and the heads were ripe when cut.

Yield of heads per acre was 6 tons 1,920 pounds.

This crop should have been sown earlier. In our experience, sunflowers cannot be sown too early; the earlier the seed is got in the larger the crop, provided the season is favourable.

EXPERIMENTS WITH SOJA BEANS.

(Soja hispida.)

Three plots of one-fortieth acre each were sown in rows, at different distances, viz.: 21, 28 and 35 inches apart, to gain information as to the best distance for sowing to secure the heaviest crops. The soil was a sandy loam of good quality. The previous crop was corn. After the corn was cut the land was ridged up with a double mould-board plough and left in ridges until the spring of 1900. The ridges were two feet and a half apart. This land received a dressing of barn-yard manure, about 12 tons per acre, during the winter of 1898 and 1899. In the spring of 1900 the ground was cultivated twice with a two-horse cultivator and twice with smoothing harrow. The beans were sown with a seed drill on May 22, and cut on September 13.

Plot 1.—Sown in rows 21 inches apart; growth strong and even, leafy; average height 40 to 44 inches. The pods were well formed, but the beans were soft when the crop was cut. Yield of green fodder, 10 tons 80 pounds per acre.

Plot 2.—Sown in rows 28 inches apart; growth strong and even, very leafy. Average height 40 to 44 inches. The pods were well formed, the beans were full grown and beginning to harden at time of cutting. Yield of green fodder, 12 tons 400 pounds per acre.

Plot 3.—Sown in rows 35 inches apart; growth strong and even, leafy, stems hard and woody. Average height 40 to 44 inches. The plants were better podded than those in plots 1 or 2, and the beans were harder when cut, but the plant was less valuable for fodder. Yield of green fodder, 10 tons 520 pounds per acre.

EXPERIMENTS WITH HORSE BEANS.

(Faba vulgaris var. equina.)

Three plots of one-fortieth acre each were sown in rows 21, 28 and 35 inches apart, to gain information as to the best distance for sowing to secure the heaviest crops. The land was adjoining that used for Soja beans, was similar in quality and received the same treatment. The previous crop was corn. The beans were sown with the seed drill; all the plots were sown on May 22 and cut September 13. The plants were free from blight.

Plot 1.—Sown in rows 21 inches apart. Growth strong, well podded. Height 42 to 46 inches, considerably lodged. The beans were nearly ripe when cut. Total yield, 9 tons 200 pounds per acre.

Plot 2.—Sown in rows 28 inches apart. Growth strong and well podded. Height 45 to 49 inches. Plot all standing, stalks considerably stiffer than in plot No. 1. The beans were nearly ripe when cut. Total yield, 8 tons 1,680 pounds per acre.

Plot 3.—Sown in rows 35 inches apart. Growth strong, well podded. Height 45 to 49 inches. Plot all standing, stalks stiff. The beans were nearly ripe when cut. Total yield, 9 tons 1,760 pounds per acre.

EXPERIMENTS WITH MILLETS.

Seven varieties were sown on plots of one-fortieth acre each. All were sown in drills 7 inches apart. The soil was a sandy loam. The previous crop was corn. The land receiving a dressing of barn-yard manure during the winter of 1898 and 1899. After the corn was cut the land was drilled up in ridges 2½ feet apart with a double mould-board plough, and left in that state until the spring of 1900, when it was cultivated twice with a two-horse cultivator and twice with a smoothing harrow before sowing. The seed was sown with a Planet Junior seed drill, and all the varieties were sown on May 23. The plots suffered from continued wet weather, and made very slow growth. These were all cut when the seed was in the doughy stage.

Number.	Name of Variety.	Date Cut.	Length of Straw.	Character of Growth	Weight Per Acre Green.		Weight Per Acre Dry.	
			Inches.		Tons	Lbs.	Tons	Lbs.
1	Italian or Indian	Sept. 12	56—60	Strong	7	1500	4	160
2	Golden	" 22	50—55	"	7	400	4	1680
3	Japanese	" 10	40—45	Medium	6	1800	4	1978
4	Algerian	" 13	50—55	Strong	5	800	3	1206
5	White Round French	Aug. 22	40—45	Medium	5	226	3	680
6	Moha Hungarian	" 22	40—45	"	5	101	3	1200
7	Pearl, late or Cat-tail	Sept. 22	30—40	"	4	1600	3	201

ORNAMENTAL TREES AND SHRUBS.

The ornamental trees and shrubs on the lawns and along the margins of the roads leading to the buildings are making rapid growth, and among them are many individual specimens of great beauty. The number of species and varieties now growing in the various clumps and groups on this part of the Experimental Farm is about 500, and includes many rare species as well as most of the more common and well-known sorts. The succession of bloom in the flowering shrubs and the many changing tints of colour shown on the foliage of both evergreen and deciduous species as the season progresses, combine to make the shrubbery borders a source of pleasure to all who see them. In plate 1 a view is presented of the planting of a part of the main road leading to the office building.

DISTRIBUTION OF SEED GRAIN TO FARMERS FOR TRIAL.

Another distribution of seed grain was made in the spring of 1900, consisting of samples of the most promising sorts of oats, spring wheat, barley, pease, Indian corn and potatoes. The object in view in these annual distributions is to place within reach of farmers, for the improvement of seed, pure samples of the best and most productive varieties in cultivation. By the careful growing of one of these samples of grain the product will soon be sufficient to sow a large area, and thus in a short time the farmer can provide himself with some of the best sorts without cost, beyond that of his own labour. The appreciation in which this part of the work is held is evidenced by the very large demand each year for such samples.

The samples sent out from the Central Experimental Farm during the early months of 1900 were distributed as follows:—

Number.	Kind of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
1	Oats	605	1,128	951	1,519	2,478	1,094	608	122
2	Barley	131	501	215	509	651	295	152	41
3	Wheat	295	736	958	1,581	932	604	300	53
4	Pease	41	536	476	446	840	546	322	66
5	Indian Corn	28	284	217	345	905	122	44	26
6	Potatoes	112	730	849	779	2,392	882	425	179
	Total	1,212	3,915	3,666	5,179	8,198	3,543	1,851	487

Total number of samples distributed 28,082
Number of applicants supplied 28,051

The following list shows the number of 3-pound packages of the different varieties which have been sent out :—

Name of Variety.	Number of Packages.
Oats.	
Improved Ligowo	2,263
Banner	1,105
Siberian	914
Golden Beauty	773
Wide Awake	590
Abundance	589
Bavarian	588
American Beauty	508
Holstein Prolific	369
Prolific Black Tartarian	297
Wallis	272
Golden Giant	139
Bonanza	100
White Schonen	67
Joanette	23
Total	8,597
Barley.	
Six-rowed.	
Mensury	817
Royal	398
Odessa	371
Oderbruch	256
Trooper	52
Two-rowed.	
Canadian Thorpe	305
French Chevalier	216
Sidney	49
	2,464
Spring Wheat.	
Preston	1,257
Red Fife	927
Percy	629
White Connell	602
Wellman's Fife	587
White Fife	478
Stanley	351
White Russian	269
Hungarian	228
Monarch	81
Spring Wheat—*Concluded.*	
Dufferin	56
Total	5,465
Pease.	
Canadian Beauty	1,353
Large White Marrowfat	950
Prussian Blue	693
Black Eyed Marrowfat	195
Total	3,191
Indian Corn.	
Selected Leaming	941
Longfellow	502
Angel of Midnight	157
White Cap Yellow Dent	135
Early Butler	103
Compton's Early	47
Champion White Pearl	39
Sanford	30
Pearce's Prolific	8
Total	1,962
Potatoes.	
American Wonder	787
Daisy	749
Carman's No. 1	643
Dakota Red	602
Wonder of the World	485
Clarke's No. 1	415
Early Sunrise	389
Rochester Rose	367
Everett	309
Early Harvest	280
Lee's Favourite	279
Henderson's Late Puritan	263
I.X.L	249
Vanier	170
Empire State	154
Early Rose	138
Burnaby Seedling	124
Total	6,403

Total number of packages distributed—

Wheat	5,465
Oats	8,597
Barley	2,464
Pease	3,191
Corn	1,962
Potatoes	6,403
Total number of samples sent out during the season	28,082

DISTRIBUTION OF SAMPLES OF GRAIN SUFFICIENT FOR ONE-TENTH OF AN ACRE.

The distribution of grain in larger samples sufficient for one-tenth acre plots begun in 1899 was continued in 1900. These samples were sent to a special but limited list of farmers selected from among those who have shown a special interest in this important work. In preparing the list for this purpose, the names have been chosen from every part of the Dominion, and every agricultural constituency has been represented.

These special samples, to the number of 3,127, have been distributed by provinces as follows:—

Name of Grain.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	N.W.T.	B.C.
Oats	51	163	173	451	491	73	57	26
Spring wheat	50	84	155	361	249	49	38	16
Barley	31	75	50	218	199	39	25	3
Total	132	322	378	1,030	939	161	120	45

The following list shows the number of these larger packages of the different varieties which have been sent out:—

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		WHEAT—*Continued.*	
Abundance	401	Percy	131
Improved Ligowo	390	Advance	107
American Beauty	260		
Banner	227	Total	977
Golden Giant	148		
Bavarian	78	BARLEY.	
Total	1,504	Royal	303
		Trooper	146
WHEAT.		Beaver	128
		Sidney	69
Preston	378		
Wellman's Fife	228	Total	646
Stanley	133		

Oats	1,504
Wheat	977
Barley	646
Total	3,127

TESTS OF THE VITALITY OF GRAIN AND OTHER SEEDS DURING 1900.

During the early months of the season of 1900, the number of samples of seed grain and other seeds tested for their vitality was 2,098. These were sent in chiefly by farmers and came from many different parts of Canada. This work is carried on from year to year to give to farmers the opportunity of having any doubtful samples tested. By this means any injury to the vitality of grain from unfavourable weather during harvest may be promptly detected and the extent of the injury ascertained. Samples may be sent to the Central Experimental Farm, free, through the mail, and the quantity necessary for the test is about one ounce. The samples are tested and reported on free of charge, and their percentage of vitality can usually be determined within two weeks after they are received.

RESULTS of Tests of Seeds for Vitality, 1899–1900.

Kind of Seed.	Number of Tests.	Highest Per centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	534	100·0	21·0	83·2	4·7	87·8
Barley	465	100·0	22·0	75·8	8·3	84·2
Oats	595	100·0	11·0	89·8	4·8	94·7
Rye	1	88·0	88·0	78·0	10·0	88·0
Pease	94	100·0	72·0	...	...	94·9
Corn	10	100·0	88·0	...	...	94·8
Grass	13	88·0	16·0	...	...	55·8
Clover	5	82·0	0·0	...	...	48·2
Turnips	20	89·0	20·0	...	...	67·2
Mangels	18	90·0	22·0	...	...	63·2
Carrots	14	62·0	7·0	...	...	40·0
Cabbage	33	96·0	6·0	...	...	58·4
Tomatoes	21	100·0	7·0	...	...	59·8
Radish	22	100·0	38·0	...	...	68·2
Lettuce	23	96·0	1.0	...	...	41·8
Spinach	8	39·0	9·0	...	...	27·0
Onions	24	84·0	1·0	...	...	46·6
Beets	17	96·0	32·0	...	...	71·6
Celery	19	87·0	3·0	...	...	50·1
Cauliflower	8	95·0	40·0	...	...	73·2
Brocoli	3	44·0	7·0	...	...	31·3
Savoy Cabbage	2	86·0	73·0	...	...	79·5
Pumpkins	4	29·0	0·0	...	...	12·5
Squash	16	80·0	0·0	...	...	18·7
Water Melon	13	75·0	0·0	...	...	14·2
Musk Melon	16	48·0	0·0	...	...	12·8
Cucumber	10	92·0	0·0	...	...	30·4
Citron	3	80·0	5·0	...	...	31·6
Sweet Peas	16	100·0	0·0	...	...	54·6
Flax	4	75·0	2·0	...	...	46·7
Mustard	4	88·0	76·0	...	...	80·2
Cress	3	78·0	2·0	...	...	50·3
Tobacco	9	85·0	26·0	...	...	58·1
Leeks	3	64·0	55·0	...	...	58·0
Salsify	3	85·0	4·0	...	...	40·6
Parsnips	3	45·0	38·0	...	...	41·0
Nasturtium	2	50·0	20·0	...	...	35·0
Chicory	3	75·0	67·0	...	...	71·0
Sweet Marjoram	4	52·0	19·0	...	...	28·5
Summer Savory	2	52·0	18·0	...	...	35·0
Sage	2	63·0	30·0	...	...	46·5
Sweet Basil	2	38·0	21·0	...	...	29·5
Carraway Seed	2	75·0	1·0	...	...	38·0
Horehound	2	2·0	0·0	...	...	1·0
Mignonette	2	18·0	13·0	...	...	15·5
Egg Plant	2	21·0	11·0	...	...	16·0
Rape	2	99·0	56·0	...	...	77·5
Tares	1	100·0	100·0	...	...	100·0
Canary Seed	1	57·0	57·0	...	...	57·0
Sunflower	1	100·0	100·0	...	...	100·0
Parsley	4	25·0	3·0	...	...	12·7
Brussel Sprouts	1	76·0	76·0	...	...	76·0
Celeriac	1	47·0	47·0	...	...	47·0
Asparagus	1	30·0	30·0	...	...	30·0
Rhubarb	1	60·0	60·0	...	...	60·0
Endive	1	66·0	66·0	...	...	66·0
Chervil	1	4·0	4.0	...	...	4·0
Anise	1	5·0	5·0	...	...	5·0
Rue	1	8·0	8·0	...	...	8·0
Thyme	1	4·0	4·0	...	...	4·0
Ampelopsis	1	5·0	5·0	...	...	5·0
Total number of samples tested, highest and lowest percentage.	2,098	100·0	0·0	...	...	...

(Signed) W. T. ELLIS.

TABLE showing Results of Grain Tests for each Province.

ONTARIO.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	130	100·0	45·0	69·4	6·8	76·3
Barley	101	100·0	60·0	83·4	9·1	92·5
Oats	139	100·0	59·0	90·6	6·8	97·4
QUEBEC.						
Wheat	52	100·0	86·0	92·3	2·8	95·1
Barley	88	100·0	64·0	85·7	8 2	94·0
Oats	51	100·0	60·0	91·0	3·2	94·2
MANITOBA.						
Wheat	117	100·0	21·0	86·8	3·7	90 6
Barley	70	100 0	22·0	87·5	6·3	93·8
Oats	135	100·0	80·0	91·8	4·0	95·9
NORTH WEST TERRITORIES.						
Wheat	109	100·0	43·0	87·1	3·9	91·1
Barley	71	100·0	75·0	90·4	4·7	95·2
Oats	112	100·0	11·0	86·3	5·5	91·8
NOVA SCOTIA.						
Wheat	25	99·0	65·0	85·1	3·8	89·0
Barley	71	100·0	69·0	72·2	16·7	89·0
Oats	25	100·0	68·0	88·2	3·5	91·8
NEW BRUNSWICK.						
Wheat	26	100·0	77·0	90·2	3·4	93·6
Barley	40	100·0	65·0	80·3	10·7	91·1
Oats	25	100·0	88·0	92·2	3·5	95·8
PRINCE EDWARD ISLAND.						
Wheat	67	100·0	63·0	86·0	4·9	91·0
Barley	22	100·0	64·0	80·7	10·5	91·2
Oats	95	100·0	66 0	88·7	4·3	93·1
BRITISH COLUMBIA.						
Wheat	8	99·0	68·0	88·2	1·6	89·8
Barley	2	97·0	97·0	95·5	1·5	97·0
Oats	13	99·0	89.0	92·0	2·4	94·5

EFFECT OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR OATS.

In the spring of 1899, six plots of one-fortieth acre each were sown with grain. Two of these plots were sown with Preston wheat, two with Mensury barley, and two with Banner oats. One of these plots in each case had clover sown with the grain at the rate of 12 pounds per acre; the other had no clover. The soil was a sandy loam of fairly good quality, and up to this time the land had ben used as a nursery. After the grain crop had been taken off, the clover was allowed to grow until late in the autumn, when it was ploughed under to the depth of 6 or 7 inches. In the spring of 1900 the land was harrowed twice with a disc-harrow and twice with a smoothing harrow, and sown with one kind of oats, viz., New Zealand, at the rate of 2 bushels of seed per acre. The oats were sown on May 4.

No. of Plot.	Variety.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield of Oats per Acre in 1900.		Rusted.
	New Zealand Oats Sown After.	Inches.		Inches.		Bush.	Lbs.	
1	Preston wheat, 1899, with clover...	48–52	Stiff	9–10½	Sided.....	53	18	Slightly.
2	Preston wheat, 1899, no clover.....	44–48	"	9–10	"	51	26	"
3	Mensury barley, 1899, with clover..	48–54	"	9–11	"	58	28	"
4	Mensury barley, 1899, no clover...	45–50	"	9–10	"	56	16	"
5	Banner Oats, 1899, with clover ...	48–54	"	9–11	"	58	28	"
6	Banner oats, 1899, no clover.	46–50	"	9–10½	"	56	16	"

The advantage arising from the sowings of clover with spring grain recorded above are quite evident but would no doubt have made much more difference but for the fact that the clover was sown late in the spring of 1899 and hence the growth for ploughing under was comparatively short and unsatisfactory.

EFFECT OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR INDIAN CORN.

In the spring of 1899, six plots, one-fortieth acre each, were sown with grain. Two of these plots were sown with Preston wheat, two with Mensury barley, and two with Banner oats. One plot in each case had clover sown with the grain at the rate of 12 pounds per acre; the other had no clover. The soil was a sandy loam of fairly good quality, and up to this time the land had been used as a nursery. After the grain was cut, the land was left untouched until the following spring, by which time the clover had made a good growth, when it was ploughed under to the depth of 6 or 7 inches. The land was then harrowed twice with a disc-harrow and twice with a smoothing harrow. The corn was sown with the seed-drill, on May 25, in rows three feet apart and cut for ensilage on September 13. The variety used for this test was Longfellow.

No. of Plot.	Variety.	Height.	Leafiness.	Late Milk.	Condition when cut.	Weight per acre grown in rows.	
	Longfellow Corn Sown After.	Inches.				Tons.	Lbs.
1	Oats Banner, 1899, no clover... .	80—90	Leafy	Late milk.....	Late milk....	14	1800
2	Oats Banner, 1899, with clover. ...	84—96	"	"	"	18	1720
3	Barley Mensury, 1899, no clover...	84—94	"	"	"	16	1440
4	Barley Mensury, 1899, with clover.	86—96	"	" . . .	"	17	1120
5	Wheat Preston, 1899, no clover....	84—94	"	"	"	16	1160
6	Wheat Preston, 1899, with clover..	86—98	" . . .	"	" . . .	19	1560

While the effect as shown by the figures given has been very decided, the clover was sown in this instance also, too late for the best results to be obtained.

INCREASE IN THE YIELD OF POTATOES BY THE PLOUGHING UNDER OF GREEN CLOVER.

In the spring of 1899, six plots of one-fortieth acre each were sown with grain, two with Preston wheat, two with Mensury barley and two with Banner oats. One plot in each case had clover sown with the grain, at the rate of 12 pounds per acre, the other had no clover. The soil was a sandy loam. In the spring of 1900, the clover was ploughed under, and the plots were all planted with one variety of potatoes, Rochester Rose. These were planted on May 28, came up June 15, and were dug October 5, with the following results :—

	Yield per acre. Bus.	Lbs.
Plot No. 1, on which Preston wheat was sown in 1899, without clover.....	280	40
Plot No. 2, on which Preston wheat was sown in 1899, with clover.....	320	..
Plot No. 3, on which Banner oats was sown, without clover..	290	40
Plot No. 4, on which Banner oats was sown, with clover....	301	20
Plot No. 5, on which Mensury barley was sown, without clover.	280	..
Plot No. 6, on which Mensury barley was sown, with clover..	330	..

EFFECTS OF FERTILIZERS ON SPRING WHEAT AND OATS.

During the past season two series each, consisting of sixteen one-eightieth acre plots, have been laid out, twelve of which in each set have been treated with different fertilizers, and the remaining four left as check plots, receiving no fertilizers. One set of these plots has been sown with spring wheat of the variety known as Preston, the other with Ligowo oats.

The object in view in this test is to watch the effects on land in a fair average condition of fertility, of barn-yard manure fresh and rotted, fresh slaked lime, nitrate of soda, superphosphate and Thomas' Phosphate, all used singly. Also, of superphosphate with kainit and with kainit and nitrate of soda, and of Thomas' Phosphate with kainit, and also with kainit and nitrate of soda.

The land chosen for this test was in a fairly good condition of tilth. The soil was a sandy loam, which had been under cultivation since 1887, and has been cropped each year since with a suitable rotation of crops, and has received a dressing of barn-yard manure about once in four years. The last application of manure was in 1897, when it received about twelve tons per acre. The land was cropped in 1899 with experimental grain plots, mostly barley.

It is proposed to grow the same crops on this land for a series of years, using the same fertilizers in the same quantities every second year. In this way it is hoped that some further information may be gained as to the effect of these different fertilizers when used singly and in combination on the two important crops named. As this land was in a fair average condition as to fertility, it may be regarded as representing in a general way, average sandy loams on farms properly worked.

RESULTS OF THE APPLICATION OF FERTILIZERS TO SPRING WHEAT.

No. of Plot.	Name of Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Rusted.
				Inches.		Inches.		Bush. Lbs.	
1	Superphosphate, 400 lbs. per acre	May 11.	Aug. 16.	40 to 43	Stiff...	3 to 4	Bearded	25·20	Slightly.
2	Thomas' phosphate, 400 lbs. per acre	" 11.	" 16.	40 43	"	3 4	" .	25·20	"
3	Thomas' phosphate, 800 lbs. per acre	" 11.	" 16.	40 43	"	3 4	" .	25·20	"
4	Check	" 11.	" 16	40 43	" ...	3 4	"	26·40	"
5	Thomas' phosphate, 400 lbs. kainit, 200 lbs. per acre	" 11.	" 16.	40 43	"	3 4	"	26·40	"
6	Superphosphate, 400 lbs. kainit, 200 lbs. per acre	" 11.	" 16.	40 43	"	3 4	" .	24·40	"
7	Check	" 11	" 16.	40 43	"	3 4	" .	25·20	"
8	Thomas' phosphate, 400 lbs. kainit, 200 lbs. nitrate soda, 100 lbs. per acre	" 11.	" 16.	40 43	" ..	3 4	" .	26·00	"
9	Superphosphate, 400 lbs. kainit, 200 lbs. nitrate soda, 100 lbs. per acre	" 11.	" 16	40 43	"	3 4	" .	26·00	"
10	Barn-yard manure, mixed, horse and cow, fresh, 12 tons, per acre	" 11.	" 16.	40 43	"	3 4	" .	24·00	"
11	Barn-yard manure, mixed, horse and cow, well rotted, 12 tons, per acre	" 11.	" 16.	40 43	" ...	3 4	" .	22·40	"
12	Check	" 11	" 16	40 43	" ..	3 4	" .	21·20	"
13	Fresh slacked lime, 1,000 lbs. per acre	" 11.	" 16.	30 36	"	2½ 3½	....	12·00	"
14	Nitrate soda, 100 lbs. per acre	" 11.	" 16.	32 36	" ...	3 3½	......	16·00	"
15	Check	" 11	" 16.	32 36	"	3 3½	....	16·00	"
16	Nitrate soda, 200 lbs. per acre	" 11.	" 16.	32 36	" ...	3 3½	....	13·20	"

The falling off in yield from plots 13 to 16 inclusive may be attributed partly to the land being lighter and of poorer quality.

RESULTS OF THE APPLICATION OF FERTILIZERS TO OATS.

No. of Plot.	Name of Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Rusted.
				Inches.		Inches.		Bush.	Lbs.	
1	Superphosphate, 400 lbs. per acre........	May 11.	Aug. 16.	45 to 50	Stiff....	8 to 9½	Branching	70	20	Slightly
2	Thomas' phosphate, 400 lbs. per acre..........	" 11.	" 16.	45 50	" ...	8 9½	" ..	72	22	"
3	Thomas' phosphate, 800 lbs. per acre...	" 11.	" 16.	45 50	" ...	8 9½	" ..	72	22	"
4	Check..................	" 11.	" 16.	45 50	" ...	8 9½	" ..	75	10	"
5	Thomas' phosphate, 400 lbs. kainit, 200 lbs. per acre..................	" 11.	" 16	45 50	" ...	8 9½	" ..	70	20	"
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	" 11.	" 16.	45 50	" ..	8 9½	" ..	73	18	"
7	Check..	" 11.	" 16.	45 50	" ...	8 9½	" ..	73	18	"
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	" 11.	" 16.	45 50	" ...	8 9½	" ..	70	20	"
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre..	" 11.	" 16.	45 50	" ...	8 9½	" ..	68	8	"
10	Barn-yard manure, mixed horse and cow, fresh, 12 tons per acre ...	" 11.	" 16.	45 50	" ...	8 9½	" ..	71	26	"
11	Barn-yard manure, mixed horse and cow, well rotted, 12 tons per acre	" 11.	" 19.	45 50	" ...	8 9½	" ..	72	32	"
12	Check......	" 11.	" 16.	45 50	" ...	8 9½	" ..	72	32	"
13	Fresh slacked lime, 1,000 lbs. per acre..........	" 11.	" 16.	45 50	" ...	8 9½	" ..	68	8	"
14	Nitrate soda, 100 lbs. per acre..	" 11.	" 15.	45 50	" ...	8 9½	" ..	72	32	"
15	Check......	" 11.	" 16.	45 50	" ...	8 9½	" ..	68	8	"
16	Nitrate soda, 200 lbs. per acre..............	" 11.	" 16.	45 50	" ...	8 9½	" ..	65	30	"

In this series of tests the check plots to which no fertilizers have been applied, have given crops averaging about as large as any of the plots on which fertilizers have been used. This would seem to show that the land this season contained all the available plant food which the crops could utilize. With the partial exhaustion which will be produced by several successive crops the relative usefulness of the different fertilizers will probably be more clearly manifest.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the annual report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn and five years' experience with crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continued ; and as explanatory regarding the preparations made and the general plan together with the way in which they have been carried on, the following paragraphs are quoted from the report of 1893 :—

'A piece of sandy loam, more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded 6 inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles, on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping.

'The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. It was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn, and in 1889 all the series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890.' In all cases the plots in each series have been sown on the same day.

'In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also the half of the barley plots cropped with sugar beets that year.' In 1894, 1895, 1896, 1897 and 1898 the one-half of the oat plots were sown again with carrots and the half of the plots devoted to wheat and barley were planted with potatoes.

TREATMENT OF SOIL.

'The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again later, about 7 inches deep. In spring the plots have been gang-ploughed once before applying the fertilizers, which are then scattered over the surface and harrowed with the smoothing harrow before sowing. On those plots where barn-yard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and just before sowing. Wherever barn-yard manure is spoken of, it is understood to be a mixture of horse and cow manure in about equal proportions.'

A summary of these permanent fertilizer plots is given each year, taking the average yield of the whole previous period, adding the results of the current year, and then giving the average yield for the full time.

OBJECTS IN VIEW IN CONDUCTING THESE EXPERIMENTS.

It should be distinctly understood that in establishing and conducting this series of experiments, the object in view has been to gain as much information as possible as to the actual effects of certain fertilizers and combinations of fertilizers on particular crops. These experiments were never intended to serve as model test plots such as farmers could copy to advantage in their general practice. On the contrary, to gain the information desired, it has been found necessary to use some fertilizers in extravagant quantities, and in other instances to more or less exhaust the soil by a succession of crops of the same sort, practices which in ordinary farming would be detrimental. Nevertheless, much useful information has been acquired, some of a positive and some of a negative character, by this long-conducted and extensive series of tests. The information now gained from year to year throws light in many ways on the action of fertilizers and is increasingly useful.

VALUABLE INFORMATION GAINED.

As results of these trials, it has been shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

At the time when these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

The use of sulphate of iron, which at the time these tests were begun, was highly recommended by an authority at that time eminent, as a reliable means of producing increased crops, has also been proven to be almost useless for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a most valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and on No. 8, also in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate was used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year 10 pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The clover seed germinated well, and after the grain was cut the young clover plants made rapid growth and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. The growing of carrots and potatoes on one-half of the cereal plots has been discontinued since 1898 and each plot of the wheat, barley and oats has occupied the full tenth of an acre.

In 1890 clover was again sown on all the plots, which produced a good growth during the season and was ploughed under in October.

APPLICATION OF FERTILIZERS DISCONTINUED.

Another direction in which information was sought was in reference to the length of time which a liberal application of barn-yard manure would continue to affect subsequent crops, and in 1899 on plots 1, 2 and 6 the barn-yard manure, which had been used for ten or eleven years in succession, was discontinued. The phosphate fertilizer was also omitted on plot 6 in each series.

In 1900 all the fertilizers on all the plots were discontinued, and it is proposed to continue to grow the same crops on all these plots from year to year without fertilizers for some years, sowing clover with the grain each season. In this way it is expected that much information will be gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which have been used on these plots since the experiments were begun.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover to advantage on the Indian corn and root plots, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre, and no fertilizers were applied. The clover on these plots has made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and thus add to the fertility of the soil, and will be left over for further growth next spring and ploughed under for the roots about May 1 and for corn about the middle of that month. Then roots and Indian corn will again be sown. This course will be continued for some years, growing Indian corn and roots every second year, and common red clover the alternate season. No fertilizers were applied in 1900, and it is proposed to discontinue their use entirely for some years, so that the effect on these crops of the ploughing under of clover every second year may be carefully studied under the varying conditions presented by these more or less exhausted plots.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894 ; and the varieties used were as follows:—In 1888-89-90 and 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, the Rio Grande wheat was used, when, owing to lack of germinating power in the seed, a larger quantity was required. In 1895, 1896, 1897, 1898, 1899 and 1900, Red Fife wheat was used in the usual quantity of 1½ bushels per acre. In 1900, the Red Fife was sown May 5, came up May 18, and was ripe from August 17 to 18.

The season of 1899 was favourable for the growing of spring wheat at Ottawa and has given in most instances crops above the average.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$TH ACRE EACH.

No. of Plot.	Fertilizers applied each Year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre	13th Season, 1900. Variety, Red Fife. Yield of Grain. Per acre.		13th Season, 1900. Variety, Red Fife. Yield of Straw. Per acre	Average Yield for Thirteen Years. Yield of Grain. Per acre.		Average Yield for Thirteen Years. Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then.	21	10	3,839	24	45	5,475	21	$26\frac{7}{13}$	3,965
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then.	21	$26\frac{4}{12}$	3,883	29	40	5,500	22	$4\frac{4}{13}$	4,007
3	Unmanured from the beginning.	10	$17\frac{11}{12}$	1,849	13	45	2,155	10	$33\frac{11}{13}$	1,873
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' Phosphate was used. No fertilizer has been applied since then	10	$22\frac{11}{12}$	1,965	15	10	2,770	10	45	2,027
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	12	$31\frac{8}{12}$	2,842	13	..	3,005	12	$33\frac{11}{13}$	2,855
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	18	$26\frac{6}{12}$	3,206	22	50	4,430	18	$46\frac{10}{13}$	3,300
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	12	$43\frac{10}{12}$	2,372	13	20	4,165	12	$46\frac{8}{13}$	2,510
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	10	$42\frac{4}{12}$	1,980	12	15	3,260	10	$49\frac{6}{13}$	2,078
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.	11	$36\frac{6}{12}$	1,809	11	55	2,865	11	$37\frac{12}{13}$	1,890
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.	12	$57\frac{11}{12}$	3,041*	12	..	2,880	12	$53\frac{6}{13}$	3,029

* This plot suffered from water in 1900.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$TH ACRE EACH—*Continued.*

No. of Plot.	Fertilizers applied each Year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre	13th Season, 1900. Variety, Red Fife. Yield of Grain. Per acre.		13th Season, 1900. Variety, Red Fife. Yield of Straw. Per acre	Average Yield for Thirteen Years. Yield of Grain. Per acre.		Average Yield for Thirteen Years. Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizer has been applied since then............	13	$55\frac{10}{12}$	2,736	18	20	3,835	14	$16\frac{2}{13}$	2,821
12	Unmanured from the beginning..	9	$40\frac{5}{12}$	1,742	11	10	2,880	9	$47\frac{4}{13}$	1,830
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	11	$43\frac{2}{12}$	1,900	15	40	2,740	12	$1\frac{5}{13}$	1,965
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	15	$9\frac{2}{12}$	2,360	14	50	3,840	15	$7\frac{9}{13}$	2,474
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	13	$17\frac{11}{12}$	2,320	16	35	2,840	13	$33\frac{1}{13}$	2,360
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	15	$19\frac{5}{12}$	2,067	15	40	2,935	15	21	2,134
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then . .	12	$5\frac{2}{12}$	2,332	16	10	2,480	12	24	2,343
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	12	$26\frac{3}{12}$	1,881	12	45	1,785	12	$27\frac{9}{13}$	1,874
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.	13	$20\frac{5}{12}$	1,486	14	25	1,965	13	$25\frac{5}{13}$	1,523
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then......................	12	30	1,880	11	45	2,010	12	$26\frac{7}{13}$	1,890
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer has been used since then	12	$33\frac{2}{12}$	1,895	14	40	1,720	12	$42\frac{12}{13}$	1,882

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, $1\frac{1}{2}$ bushels in 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898, 1899 and 1900. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows : 1889, 1890 and 1891, Saale ; 1892, Goldthorpe ; 1893, Duck-bill ; and in 1894, 1895, 1896, 1897, 1898, 1899 and 1900, Canadian Thorpe, a selected form of the Duck-bill. In 1900 the Canadian Thorpe was sown on May 7, came up May 18 and was harvested from August 1 to 8.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each Year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years. Yield of Grain. Per acre.		Average Yield for Eleven Years. Yield of Straw. Per acre	12th Season, 1890. Variety, Canadian Thorpe. Yield of Grain. Per acre.		12th Season, 1890. Variety, Canadian Thorpe. Yield of Straw. Per acre	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre
		Bush	lbs.	Lbs.	Bush	lbs.	Lbs.	Bush	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then.....	34	$35\frac{5}{11}$	3,034	36	22	2,860	34	$42\frac{4}{12}$	3,019
2	Barn-yarn manure, fresh, 15 tons per acre, each year to 1898 inclusive. No manure has been applied since then.............	35	$14\frac{7}{11}$	3,260	34	33	2,520	35	$12\frac{2}{12}$	3,198
3	Unmanured from the beginning...	13	$20\frac{1}{11}$	1,546	9	33	1,135	13	$5\frac{2}{12}$	1,512
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used, no fertilizer has been applied since then.................	13	$47\frac{2}{12}$	1,444	16	2	1,275	14	$7\frac{5}{12}$	1,430
5	Mineral phosphate, untreated, finely ground; 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then	19	$35\frac{10}{11}$	2,232	26	2	2,270	20	$13\frac{1}{12}$	2,235
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	27	$44\frac{2}{11}$	2,404	26	27	2,080	27	$38\frac{9}{12}$	2,377
7	Mineral phosphate, untreated, finely ground, 500 lbs; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then..............	23	34	2,391	32	24	2,520	24	$21\frac{2}{12}$	2,402
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas's phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	19	$26\frac{2}{11}$	1,688	20	45	1,980	19	$31\frac{9}{12}$	1,712
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been used since then............	20	$35\frac{5}{11}$	1,871	18	21	1,105	20	$26\frac{3}{12}$	1,807
10	Mineral superphosphate. No. 1, 350 lbs; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then. ...	27	$2\frac{2}{11}$	2,369	31	42	2,220	28	$13\frac{6}{12}$	2 357

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years.			12th Season, 1900. Variety, Canadian Thorpe.			Average Yield for Twelve Years.		
		Yield of Grain. Per acre.		Yield. of Straw. Per acre	Yield of Grain. Per acre.		Yield. of Straw. Per acre	Yield of Grain. Per acre.		Yield. of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizer has been applied since then.....	26	$8\frac{4}{11}$	2,516	26	32	2,395	26	$10\frac{4}{12}$	2,506
12	Unmanured from the beginning..........	13	1	1,211	11	32	1,260	12	$43\frac{7}{12}$	1,215
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	13	$33\frac{3}{11}$	1,375	16	7	1,905	13	$43\frac{1}{12}$	1,419
14	Bone, finely ground 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	22	19	2,010	25	35	2,370	22	$32\frac{4}{12}$	2.040
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	21	37	2,329	23	6	2,325	21	$42\frac{5}{12}$	2,329
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	22	$3\frac{1}{11}$	1,836	22	39	1,725	22	$6\frac{1}{12}$	1,827
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	18	$11\frac{5}{11}$	1,987	23	16	1,340	18	$31\frac{10}{12}$	1,933
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	17	$34\frac{5}{11}$	1,741	20	15	1,150	17	$41\frac{10}{12}$	1,692
19	Common salt (Sodium chloride) 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then..........................	27	$44\frac{5}{11}$	2,056	23	26	1,580	27	$26\frac{11}{12}$	2,016
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	19	$22\frac{1}{11}$	1,632	21	7	1,310	19	$28\frac{10}{12}$	1,605
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer has been applied since then..........................	20	$7\frac{8}{11}$	1,826	20	15	1,445	20	$8\frac{4}{12}$	1,794

OAT PLOTS.

The quantity of seed sown per acre on the oat plots, was 2 bushels in 1889 and 1890; $1\frac{1}{2}$ bushels in 1891, 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898, 1899 and 1900. The varieties used were as follows: In 1889, Early English; in 1890, 1891, 1892 1893, Prize Cluster; and in 1894, 1895, 1896, 1897, 1898 1899 and 1900, Banner. In 1900 the Banner was sown May 5, came up May 19, and the plots were harvested from August 15 to 17.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, $\frac{1}{10}$ ACRE EACH.

Number of Plot.	Fertilizers applied each Year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years. Yield of Grain. Per acre.		Average Yield for Eleven Years. Yield of Straw. Per acre	12th Season, 1900. Variety, Banner. Yield of Grain. Per acre.		12th Season, 1900. Variety, Banner. Yield of Straw. Per acre	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then.....	49	$3\frac{1}{11}$	3,136	69	9	3,520	50	$26\frac{3}{12}$	3,168
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then.............	54	$18\frac{6}{11}$	3,345	66	21	3,665	55	$18\frac{9}{12}$	3,372
3	Unmanured from the beginning	30	$20\frac{5}{11}$	1,484	47	2	1,955	31	$33\frac{1}{12}$	1,523
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer has been applied since then	30	$23\frac{3}{11}$	1,691	42	12	1,660	31	$22\frac{7}{12}$	1,688
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.....	48	$21\frac{2}{11}$	2,719	52	17	2,235	48	$32\frac{2}{12}$	2.679
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	45	$1\frac{9}{11}$	2,569	71	6	3,115	47	$7\frac{10}{12}$	2,615
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then......................	46	$9\frac{5}{11}$	3,161	65	15	3,025	47	$29\frac{9}{12}$	3,150
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then..... ..	40	$8\frac{2}{11}$	2,275	51	16	3,430	41	6	2,371
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been used since then	35	$\frac{10}{11}$	1,938	51	31	1,840	36	$14\frac{9}{12}$	1,930
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	46	21	2,772	53	28	2,275	47	$7\frac{5}{12}$	2,731

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, $\frac{1}{10}$ ACRE EACH—*Continued.*

Number of Plot.	Fertilizers applied each Year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years. Yield of Grain. Per acre.		Average Yield for Eleven Years. Yield of Straw. Per acre	12th Season, 1900. Variety. Banner. Yield of Grain. Per acre.		12th Season, 1900. Variety. Banner. Yield of Straw. Per acre	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre
—		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. No fertilizer has been applied since then	36	$4\frac{9}{11}$	2,376	45	20	2,830	36	$31\frac{7}{12}$	2,414
12	Unmanured from the beginning...........	21	$9\frac{7}{11}$	1,493	26	31	1,035	21	$25\frac{7}{12}$	1,455
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	33	$25\frac{8}{11}$	1,960	41	16	2,295	34	$13\frac{7}{12}$	1,988
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then ..	37	$27\frac{10}{11}$	2,176	62	2	2,495	39	$28\frac{7}{12}$	2,203
15	Nitrate of soda, 200 lbs per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then....	46	$7\frac{4}{11}$	2,684	64	19	2,705	47	$25\frac{4}{12}$	2,686
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	34	24	2,103	55	10	2,270	36	$14\frac{4}{12}$	2,117
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	43	$21\frac{7}{11}$	2,958	51	31	2,335	44	$11\frac{1}{12}$	2,906
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then ...	35	$13\frac{3}{11}$	2,078	44	29	1,675	36	$6\frac{1}{2}$	2,014
19	Common salt (Sodium chloride) 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then......	35	$5\frac{10}{11}$	1,931	43	8	1,830	35	$28\frac{9}{12}$	1,923
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	32	$24\frac{8}{11}$	1,995	39	9	1,670	33	$9\frac{3}{12}$	1,968
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer has been applied since then...	33	$6\frac{7}{11}$	1,851	49	4	1,580	34	$17\frac{9}{12}$	1.828

METEOROLOGICAL OBSERVATIONS.

Table of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1900; maximum, minimum and mean temperature for each month, with date of occurrence, also Rainfall and Snowfall.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days' Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.		In.	
Jan	26·02	3·90	22·11	14·95	39·0	23rd	—11·5	24th	0·54	15·00	2·04	15	5·00	12th
Feb	24·29	8·01	17.91	16·96	41·0	9th	—21·5	2nd	1·95	14·75	3·42	11	4·50	5th
March ..	27·52	7·42	20·10	17·47	42·0	19th	—14·2	18th	0·08	40·00	4·08	13	12·00	2nd
April ...	55·36	34·13	21·23	44·74	75·0	21st	20·0	9th	1·12	...	1·12	7	0·48	18th
May. ..	66·04	40 72	25·32	53·38	86·2	14th	26·5	11th	3·70	......	3·70	14	1·50	8th
June....	78·19	55·15	23·04	66·67	86·8	27th	46·0	4th	3·83	......	3·83	13	1·73	2nd
July....	78·69	58·36	20·32	68·52	88·2	7th	48·8	1st	6·45	. . .	6·45	16	2·34	17th
August .	79·66	57·82	21·84	68·74	91·2	25th	48·0	4th	2·84	......	2·84	12	0 99	7th
Sept ...	70·65	51·10	19·55	60·87	93·8	2nd	36·0	19th	4·15	......	4·15	14	0·77	16th
Oct.....	64·42	43·00	21·41	53·70	79·6	4th	24·0	20th	1·61	......	1·61	11	0·46	8th
Nov.....	39·99	26·25	13·73	33·11	63·8	1st	4·9	17th	3·00	17·00	4·70	22	6·00	19th
Dec.....	24·75	8·33	16·41	16·53	38·0	20th	—15·8	10th	0·21	21·25	2·33	19	6·00	5th & 13th
									29·48	108·00	40·27	167		

Rain or snow fell on 167 days during the 12 months.
Heaviest rainfall in 24 hours, 2·34 inches on July 17.
Heaviest snowfall in 24 hours, 12·00 on March 2.
It will be seen the highest temperature during the 12 months was 93·°8 on September 2.
The lowest temperature during the 12 months was —21·°5 on February 2.
During the growing season rain fell on 7 days in April, 14 days in May, 13 days in June, 16 days in July, 12 days in August and 14 days in September.
April shows the lowest number of days on which rain fell, viz., 7.
Rain or snow fell on 22 days in November.
Total precipitation during the 12 months, 40·27 inches, as compared with 41·63 inches during 1899.

Rainfall, Snowfall and total Precipitation from 1890 to 1900, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	Inches.	Inches.	Inches.
1890........	24·73	64·85	31·22
1891........	30·19	73·50	37·54
1892........	23·78	105·00	34·28
1893........	31·79	72·50	39·04
1894........	23·05	71·50	30·20
1895........	27·01	87·50	35·76
1896........	21·53	99·75	31·50
1897........	24·18	89·00	33·08
1898........	24 75	112·25	36·02
1899........	33·86	77·25	41·63
1900........	29·48	108·00	40·27
Total	294·35	961·10	390·54
Yearly average for 11 years	26·75	87·37	35·50

RECORD of Sunshine at Central Experimental Farm, Ottawa, for the Years 1898, 1899 and 1900.

Months.	1898.				1899.				1900.			
	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	21	10	97·4	3·14	18	13	91·2	2·94	18	13	96·4	2·46
February	15	13	67·5	2·41	19	9	102·1	3·64	20	8	110·2	3·93
March	26	5	171·5	5·53	17	14	124·1	4·00	26	5	177·9	5·73
April	29	1	233·8	7·79	26	4	228·8	7·62	26	4	212·7	7·09
May	30	1	186·3	6·01	27	4	225·4	7·27	27	4	241·6	7·79
June	29	1	184·9	6·16	29	1	257·1	8·57	27	3	282·2	9·40
July	30	1	272·8	8·80	29	2	271·3	8·75	29	2	225·1	7·26
August	Instrument out of order.				31	0	271·2	8·74	30	1	270·7	8·73
September	27	3	166·9	5·23	22	8	128·9	4·29	22	8	164·4	5·48
October	21	10	106·0	3·41	23	8	120·4	3·88	26	5	148·7	4·79
November	21	9	91·3	3·04	17	13	77·0	2·56	18	12	71·7	2·39
December	15	16	54·3	1·75	17	14	50·1	1·61	16	15	34·0	1·09

WILLIAM T. ELLIS,
Observer.

VISIT TO GREAT BRITAIN AND FRANCE.

On July 21, I took passage in the steamer *Dominion*, from Montreal, and after a very pleasant journey arrived in Liverpool on the 31st of the month.

VISIT TO GARTON BROS., WARRINGTON.

One of the first places visited in England was the establishment of Garton Bros., a firm well-known for the useful and interesting work they have done in the cross-fertilizing of cereals. Their seed establishment is at Warrington, about an hour's ride by rail from Liverpool, while their experimental grounds are at Newton le Willows, some 6 or 7 miles distant from Warrington. After looking carefully over the interesting samples of new sorts of grain shown at the seed warehouse, I was driven to the experimental grounds, where under the guidance of the senior member of the firm, the grounds were inspected. These included a very large number of plots of different varieties of cereals, among which there were many new sorts of wheat with heads of various forms and sizes. Among the crosses of Miracle or Eldorado wheat, *Triticum turgidum*, there were some very curious things, also some very large and robust looking heads, crosses of Greek Summer wheat, *Triticum durum*, with other varieties. Many fine new strains of the ordinary winter wheat were also seen.

In barley there were a number of interesting sorts, one of which is said to be very stiff in the straw, and another to have smut-resisting qualities.

The work which has been done by the Garton Bros. in oats interested me much. In some of their new crosses the naked oat of China has been used as one of the parents, and evidence of the influence of this oat on the progeny is visible in the character of the panicle, in which the number of grains in the cluster is increased. These crosses seem likely to be very productive. Sufficient quantities of some of the more promising of these new cereals have been secured for experimental tests in Canada.

AGRICULTURAL EDUCATION AND EXPERIMENTAL AGRICULTURE IN ENGLAND.

A large sum is annually paid by the government of Great Britain to the forty-nine County Councils of England for technical education. This amounted to £826,450 in 1897-8, and £834,908 in 1898-9, being an average of over four million dollars per annum. A proportion of this is spent in educational and experimental work in agriculture. The total amount spent during the past year for the promotion of agriculture was about £80,000, nearly $400,000. The work is carried on in many different ways, but a considerable sum is spent in conducting agricultural field experiments, a large proportion of which are experiments with manures on various crops. Other sums are devoted to horticulture, dairying, poultry keeping, bee keeping, farriery, &c. In many instances this work is carried on *directly* under control of committees of the council, who establish agricultural and horticultural schools, and dairy institutions, direct field experiments in agriculture, arrange for competitions in ploughing, hedging, ditching, horse-shoeing, &c., give scholarships in agriculture to those attending schools and colleges, organize travelling dairies and employ lecturers in agriculture and horticulture, who visit and address farmers in different parts of the county. Reports are also published of the work carried on.

Further grants for special work in connection with agricultural education and research are given by the Board of Agriculture. These grants in 1898, amounted in all to £7,350, nearly $36,750. The sums given vary from £50 to £800.

There is thus a considerable amount of money spent in promoting agriculture in England, much of which is no doubt well used, but in other instances monies are probably less judiciously expended.

The following are cited as examples of expenditure:—Surrey, a county which spends from £4,000 to £5,000 in connection with agricultural education, is said to spend this sum in part *directly* under control of a committee of the council on horticultural school gardens, instruction at shows, and on allotments and scholarships, and *indirectly* instruction is given in bee keeping, under direction of the Berks Bee Keepers' Association, and demonstrations in field experiments by the University Extension College at Reading, an institution which this county conjointly with other counties supports.

The county of Cornwall, which spends from £1,200 to £1,500 yearly, expends this directly through the technical instruction committee, assisted by local district committees.

Experiments are conducted in the manuring of permanent pastures, turnips and other crops. Experiments are also conducted with different sorts of fruits.

In several instances two or more counties combine in carrying on experimental work or in maintaining agricultural schools, for example Durham, Cumberland, and Northumberland combine in maintaining the agricultural work of the Durham College of Science.

VISIT TO COCKLE PARK.

A visit was paid to the experimental farm worked by these three counties, known as Cockle Park, which is about ten miles from Newcastle-on-Tyne, and consists of about 450 acres. Many experiments were in progress there with fertilizers on different crops ; some varietal tests are conducted with oats, including some of the new varieties of Garton Bros. Trials are also made of rotation plots. A number of experiments were in progress in the fattening and breeding of sheep, and in testing the effects of fertilizers on the nutritious qualities of pasture grasses. Experiments have also been tried with lime as a preventive of finger and toe disease in turnips, using it in varying quantities, from 1,000 to 8,000 pounds per acre. Experiments covering several acres are in progress in tree growth, ten blocks of half an acre each or less being devoted to this purpose. A well stocked and well kept nursery is also an interesting feature on this farm. Excellent work along many useful lines has been carried on at this institution for the past seven years, under the able management of Prof. Wm. Somerville, who has recently been appointed Professor of Agriculture at Cambridge University.

EXPERIMENTAL GROUNDS AT LAUNCESTON, CORNWALL.

The experimental grounds at Launceston, Cornwall, were also visited. This is one of three stations carried on by the County Council of Cornwall. This station was entirely devoted to experiments in horticulture. The land occupied was about two acres, a short distance from the town of Launceston. The soil was a good clay loam, and most of the land was occupied by different varieties of apple, pear and plum trees, some of which were beginning to bear. The varieties were mostly of the well-known standard sorts. A small area was devoted to the testing of raspberries, strawberries, gooseberries, and red and black currants. Tests were also being made with tomatoes.

READING COLLEGE AND BRITISH DAIRY INSTITUTE.

A pleasant day was spent at Reading, in visiting Reading College and the British Dairy Institute. Under the guidance of Prof. D. A. Gilchrist, director of the agricultural department, I was shown through the buildings, and learned much regarding the working of these useful institutions. The College and Institute occupy adjoining sites in the town of Reading, within a few minutes walk of the railway stations. The College was founded in 1892; the British Dairy Institute, which was established at Aylesbury in 1888, by the British Dairy Farmers' Association, was removed to Reading in 1896, to the newly-erected building, where it was placed under the management of a joint committee, representing the British Dairy Farmers' Association and Reading College.

The building of the British Dairy Institute is very complete in its appliances for practical teaching and experimental work. In addition to the well-arranged lecture rooms and reading room, it has large milk-receiving, butter-making and milk-testing rooms, four rooms for the manufacture of pressed, unpressed and soft cheeses, and seven rooms for the ripening of different varieties of cheese.

The higher certificate in dairying is granted to successful students who have spent one year at the college, six months at an approved dairy institute, and six months on a dairy farm.

A short course in dairy instruction is also provided, of ten weeks, when successful candidates receive certificates.

Reading College is managed by a council, in which are representatives of the County Councils of Berkshire, Buckinghamshire, Dorset, Hampshire and Oxfordshire, subsidies being granted by all these bodies to meet the cost of carrying on the agricultural work of the institution. The College is affiliated with Oxford, and has, in addition to the agricultural teaching, departments of letters and science, music and the fine arts, and provides teaching for about 1,000 day and evening students.

The diploma in agriculture requires a two-years course at the College, and one year in practical work on a farm. A shorter course in agriculture is also provided, of six weeks, at the end of which time certificates are awarded to successful students. This is designed for candidates already familiar with farm work.

The College undertakes work in the adjoining counties in connection with field experiments, and lectures at rural centres, and advises with regard to insect pests, plant diseases and the manuring of crops. Field experiments are carried on at several different points in each of the counties represented on the college council, the use of the land required for this purpose being given by prominent farmers. The size of the plots are from one-tenth acre, sometimes less, to one-fourth acre each, and from eight to twelve plots are used in each case. The lines of experimental work carried on have been with manures as top dressings on pasture ; also with crops of turnips and potatoes; rotation experiments, tests of varieties of oats, experiments in sowing lucerne and sanfoin; also with lime as a remedy for the disease known as finger and toe in turnips. In order to give a more permanent character to the experimental work, the Hampshire County Council has recently leased 2½ acres of land at Botley, as a permanent station for field experiments.

VISIT TO CAMBRIDGE.

A visit was also made to Cambridge and a profitable day spent with Prof. Wm. Somerville, Professor of Agriculture in Cambridge University. In addition to the lectures on practical and scientific agriculture given at Cambridge arrangements have recently been made for the establishment of an experimental farm in connection with the University where experiments in agriculture of a permanent character will be conducted. A visit was paid to this farm which consists of about 180 acres, located some eight miles from the town of Cambridge.

About 150 acres of this land are available for experimental work, and 30 acres are in permanent pasture. It is proposed to devote about 60 acres of good even arable soil to experiments with grain and other important farm crops. A sufficient area will also be set aside for horticultural investigations. There are at present about 2½ acres of land on the farm in forest and it is proposed to set aside 6½ acres more for experimental work in tree planting. The land appears to be very suitable for the purpose, is of good quality, well situated and very even in character. At the time of my visit possession of this property had just been acquired. Work will be begun with experimental plots in the spring of 1901.

Prof. Somerville has also the supervision of 40 acres of land in Northampton, which has been rented for a term of years to determine the quality and nutritious properties of the grass grown with different fertilizers ; the experiments being similar to those which Prof. Somerville has heretofore carried on so successfully at Cockle Park. Forty acres are under similar control in Hampshire and a like area in Cambridgeshire. In Norfolk and Essex from 16 to 20 acres are also under this line of experiment.

It was my purpose to visit several other of the more important experimental stations and teaching colleges in England, particularly those at Wye, under the direction of Prof. A. D. Hall, where a number of important lines of work are being conducted ; the Woburn Experimental Farm, under direction of Dr. Voelcker. The Woburn Experimental Fruit Farm, established by the Duke of Bedford, and under the management of Prof. Spencer Pickering. The agricultural and horticultural school at Holmes Chapel, under the Cheshire County Council. The field experiments conducted at Bramford, under a committee of the East Suffolk County Council and the Agricultural College at Cirencester. The limited time, however, at my disposal was not sufficient to permit of the carrying out of these plans.

KEW AND ROTHAMSTED, &c.

A profitable day was spent at the Royal Gardens at Kew inspecting the large number of interesting trees, shrubs and plants growing there, and another day was devoted to Rothamsted.

The recent lamented death of Sir John Lawes had thrown a gloom over Rothamsted and deprived me of the pleasure I had hoped for of renewing the acquaintance formed in 1886 with that venerable experimenter. Sir Henry Gilbert was also absent, but Dr. N. H. Miller, who was in charge, very kindly showed me over the grounds and answered my many inquiries.

The grain harvest was over at the time of my visit, but I saw the plots of roots grown with and without fertilizers, also the grass plots from which a second crop was then being cut. It was a great pleasure to see these experimental grounds once more, and with Dr. Miller's kindly help the visit was made a very instructive one.

Visits were also made while in England to some of the leading nurseries—to Dickson's extensive grounds at Chester, where a large number of most interesting things were seen ; to Sutton's seed warehouses and trial grounds at Reading, to Barr & Sons, the well-known growers of narcissus and paeonies and to Amos Perry's noted establishment for hardy perennials, at Winchmore Hill, near London. At all these places valuable material was secured for experimental tests in Canada.

WALES.

Several days were spent in Wales, this was early in August when the crops were still on the ground. Much of the grain over most of the country travelled was lodged, and the crops seemed light, and the general condition of the farming of the country appeared to be backward. The small black Welsh cattle were common and Welsh sheep very plentiful, but the swine seen were of a very nondescript character.

The objective point in this journey was the Agricultural College at Aberystwith, and the scenery of the country passed through was delightful. On the way many large tree plantations were observed where bare hills had been clothed with a luxuriant growth of European larch, many of the plantations having attained a sufficient size to furnish merchantable timber.

Aberystwith is very prettily situated on the sea shore, and from the college buildings there are fine views of the water.

The teaching carried on in the agricultural department at the college consists of a three years' course for the degree in agriculture, a two years' course for a diploma, and a seven weeks' course for farmer's sons, when, if the prescribed examination is passed, a certificate of proficiency is given.

In dairying several courses of instruction are carried on, a twenty weeks' course, a ten weeks' course, and also one of six weeks. Instruction in dairying is also given at local centres by means of travelling dairies, and courses of lectures on agriculture are also given to farmers in rural centres in the adjoining counties.

About two acres of land convenient to the college are under control of the agricultural staff, and an additional area of 30 acres has been recently secured. One acre is devoted to an experimental orchard, about one half of which has been planted with apples, pears and plums. Half an acre is in use for testing different sorts of vegetables and a quarter of an acre is devoted to experiments with grain, in testing the influence of fertilizers of different sorts on their growth.

An association has been formed there of ex-students, to carry on experiments with fertilizers on their individual farms, and there are now in all about 40 of these co-operative stations.

SCOTLAND.

Glasgow and Edinburgh were the points visited. A few hours were pleasantly occupied in examining the collection of trees, shrubs and plants brought together in the Glasgow Botanic Gardens, and in visiting the buildings in course of construction for the great exhibition to be held there in 1901. The chief object in my visit to Glasgow was to gain some information regarding the West of Scotland Agricultural College.

This useful agricultural institution was established a year ago, under the direction of Prof. R. Patrick Wright. Prior to this it existed as a department of the Glasgow Technical College, and there was a separate dairy school at Kilmarnock. Now the dairy school and a recently acquired experimental farm of 200 acres has been united with the Agricultural College, which will supply the means for permanent experimental work. The dairy school is carried on during the summer months only. The building where the teaching work is done is conveniently situated in a central part of the city of Glasgow, and is provided with all the appliances necessary for effective teaching. Practical agriculture, agricultural chemistry and botany are the leading branches taught.

In connection with this College an extensive system of experimental work has been conducted for the past eight years on about fifty different farms, in the central and southwest counties of Scotland. The experiments are very comprehensive in their character, and are for the most part along the following lines : The effects of farm-yard and artificial manures on hay, grain, roots and potatoes. Investigations regarding the mealing power of oats grown with different fertilizers, the effect of fertilizers on the quality of the hay produced, their influence on the size and quality of potato tubers. Rotation of crops has been the subject of many experiments, and many varietal tests have been conducted with oats. Tests have also been carried on in the feeding of sheep. The more prominent farmers in different parts of Scotland have taken much interest in this work, and are free in offering the use of such limited portions of their land as may be required for carrying on these experiments. No payment is made to the experimenters, but the manures and seed are usually supplied. Each farm where experiments are in progress is visited by a member of the staff, at least once during the season, when lectures are frequently given in the locality, and the results are subsequently published in bulletin form. The College is affiliated with Glasgow University, and students who attend the full course of three years in the college and pass the examinations, obtain the degree of B. Sc. in the University. The dairy sessions are for ten weeks, and include practical work on butter and cheese. Students who succeed in passing the examinations receive certificates at the end of the course.

THE DALMENY EXPERIMENTAL GROUNDS.

These were established and are maintained by Lord Rosebery, in connection with his large estate at Dalmeny, a few miles from Edinburgh. At the time of my visit I was so fortunate as to meet both Mr. Drysdale, Lord Rosebery's factor, and Mr. John Hunter, who has charge of the scientific research work at Dalmeny. These gentlemen courteously showed me through the experimental grounds, and explained the objects in view in the various trials being made. Experiments were in progress with wheat, barley and oats, and with different fertilizers on these crops, also tests regarding the unexhausted value of manures, which had been applied to previous crops for three or four years. On these plots crops were now being grown, and would be grown for several years in succession without manures.

In the experiments conducted at Dalmeny, lime has been found very useful to all sorts of crops, in the form of an annual limited dressing of about 450 pounds per acre.

These experimental grounds, as explained by Mr. Drysdale, had been established by Lord Rosebery for the purpose of finding out the best method of producing the best possible crop, at the least possible cost, and the experience gained by the experimental plots was made good use of on the larger fields on the farm.

MEETING OF THE BRITISH ASSOCIATION.

On leaving Scotland a visit was paid to Bradford, in Yorkshire, where the meeting of the British Association was being held. On an invitation extended by the president of the Section of Economic Science, I prepared the following paper on experimental agriculture in Canada, which was read before the Association.

RESULTS OF EXPERIMENTAL WORK IN AGRICULTURE IN CANADA, UNDER GOVERNMENT ORGANIZATION, BY DR. WM. SAUNDERS, DIRECTOR CANADIAN EXPERIMENTAL FARMS.

There is probably no country in the world where nature has been more liberal in the stores of fertility provided in the soil, or where the land has greater capacity for the production of food for the human race than in Canada. While the resources of the Dominion in its minerals, its forests and its fisheries are great and valuable it is in the soil that the greater wealth of the country lies. The immensity of the area of good and fertile land in Canada is very imperfectly understood even by those who have had the opportunity of visiting the country, and but a very small proportion of the arable land has yet been brought under cultivation.

The climatic conditions in Canada are very dissimilar in different parts, and are not favourable everywhere for the production of the same crops. Very large areas, however, particularly in the great plains of Manitoba and the North-west Territories, are specially adapted for the production of cereals, particularly wheat of the highest quality. In other and more limited districts conditions prevail which render them very suitable for the growing of fruits. Nearly all the arable lands of the Dominion offer advantages for mixed farming, for the growing of different sorts of grain, grasses, roots and other forage plants, and for the raising of cattle, swine, sheep and poultry, and for the production of butter and cheese. More than half of the entire population are engaged in agricultural pursuits, but the population is as yet sparse, and the area of unoccupied land so very large that no adequate conception can be formed as to the vast quantities of food products which Canada could produce were its inhabitants at all proportionate to its resources.

With such conditions it is apparent that the developing and fostering of the agricultural interests of Canada is a subject of pre-eminent importance to all classes of her people, and is one which frequently engages the attention of both the federal and provincial governments.

In 1884, the House of Commons appointed a select committee to inquire into the best means of developing and encouraging the agricultural interests of Canada. This committee made a careful inquiry into the subject, also as to the disadvantages and wants experienced by agriculturists in Canada, taking evidence from various persons, who had made a special study of the different branches of industry included under the general term Agriculture, and of others having a scientific knowledge bearing on this subject. In the report subsequently submitted to the House of Commons, the substance of the evidence accumulated is thus summarized :—

'Notwithstanding the great progress made in recent years, it appears that there is a large amount of defective farming in this country. In the cultivation of cereals, roots and grasses there is want of periodical change of seed, selection of improved varieties, a proper rotation of crops, with a lack of thorough tillage and a knowledge of the value and suitability of manures. The value of manures is, in many cases, unheeded, and much fertilizing power is lost through negligent exposure and the waste of liquid manures. In stock-raising the chief deficiencies are the want of pure-bred males, lack of knowledge of the adaptability of breeds to particular conditions throughout the Dominion, the want of better pasture and more abundant tree shelter. In the production of butter, the milk is frequently not properly cared for, nor is suitable attention paid to the selection of milch cows, and the food given is often deficient in nutriment and in milk-producing qualities.

'Low grades of butter are attributable to want of skill in its manufacture and want of improved apparatus. In cheese making, the need of greater skill and want of scientific knowledge is also felt. In the cultivation of fruit a great want is experienced in many sections of hardier varieties, and of varieties with improved keeping qualities. There is also a deplorable want of knowledge regarding the insects and diseases injurious to fruit trees.'

This committee also reported that in the replies they had received to a number of questions submitted to many leading farmers in every part of the Dominion, a large proportion advised the establishment of experimental farms, not only a central one, but also branch farms in every province. The protection of farmers against the sale of fraudulent fertilizers was also urged. The committee recommended that the government establish an experimental farm or farms where experiments might be carried on in connection with all branches of agriculture and horticulture, and that the results of the work conducted should be published from time to time and disseminated freely amongst the farmers of the Dominion.

No action was taken by the government on this matter until November, 1885, when, on the accession of the Honourable, now Sir John Carling, to the position of Minister of Agriculture for the Dominion, he instituted measures for the accumulation of further information so that the fullest data might be available, and the experimental farms so much needed established on the most approved plans without further delay. Particulars regarding experimental stations then in operation in Europe and America were obtained and published, and during the session of parliament for 1886, an Act was introduced and passed almost unanimously, authorizing the government to establish a central experimental farm and four branch farms. The principal or central farm was to be located at or near the capital, Ottawa, where it was to serve the purposes of the two larger provinces, Ontario and Quebec The branch farms were to be distributed as follows :—

One for the Maritime provinces jointly, one for Manitoba, one for the North-west Territories and one for British Columbia.

The work which was to be undertaken at these several experimental farms was thus set forth in the Act.

(a.) Conduct researches and verify the experiments designed to test the relative value, for all purposes, of different breeds of stock, and their adaptability to the varying climatic or other conditions which prevail in the several provinces and in the the North-west Territories ;

(b.) Examine into scientific and economic questions involved in the production of butter and cheese ;

(c.) Test the merits, hardiness and adaptability of new or untried varieties of wheat and other cereals, and of all field crops, grasses and forage plants, fruits, vegetables, plants and trees, and disseminate among persons engaged in farming, gardening or fruit-growing, upon such conditions as are prescribed by the Minister of Agriculture, samples of such surplus products as are considered to be specially worthy of introduction ;

(d.) Analyze fertilizers, whether natural or artificial, and conduct experiments with such fertilizers, in order to test their comparative value as applied to crops of different kinds ;

(e.) Examine into the composition and digestibility of foods for domestic animals;

(f.) Conduct experiments in the planting of trees for timber and shelter ;

(g.) Examine into the diseases to which cultivated plants and trees are subject, and also into the ravages of destructive insects and ascertain and test the most useful preventatives and remedies to be used in each case ;

(h.) Investigate the diseases to which domestic animals are subject ;

(i.) Ascertain the vitality and purity of agricultural seeds ; and

(j.) Conduct any other experiments and researches bearing upon the agricultural industry of Canada, which may be approved by the Minister of Agriculture.

In October, 1886, I had the honour of being appointed Director of the experimental farms for Canada, and under Sir John Carling, was intrusted with the work of selecting the necessary sites also in the choice of the officers required to carry on the work of the several institutions. Within two years the land for the several farms was secured, the necessary officers appointed, most of the buildings erected and the farms put in practical operation. The central farm was located near Ottawa, the branch farm for the three eastern provinces at Nappan, Nova Scotia, a central point near the boundary of New Brunswick and fairly convenient to Prince Edward Island. The experimental farm for Manitoba was placed at Brandon, that for the North-west Territories at Indian Head, in Assiniboia, and the farm for British Columbia at Agassiz, in the coast climate of that province.

In the choosing of these sites the purpose in view was to have them so located as to be fairly representative of the larger settled areas in the provinces in which they were placed, while in the arrangement of the work such experiments as would be most likely to be beneficial to the larger number of settlers in each case were among the first to engage the attention of the officers in charge.

Twelve years have passed since this work was inaugurated and during that time agriculture in Canada has made unprecedented advancement. While it is not claimed that this progress has been wholly due to the work and influence of the Dominion Experimental Farms, much credit is justly due to the various measures carried on by the useful organisations established by the several provinces. There is, however, no doubt that the institutions established by the Federal Government have been a most important factor in this connection. The progress referred to has resulted in improving the condition of the agricultural population all over the country, and in a vast increase in the exports of agricultural products.

Investigation and experimental research has been carried on along all the lines of work laid down in the Act which originated these farms and a great mass of important facts have been accumulated in all branches of agriculture, and those sciences which contribute to a thorough knowledge of its governing laws as may be seen in the annual reports presented to the government.

There is probably no employment which engages man's attention, that requires more skill and more general information than farming. Competition is keen throughout the civilized world, and the farmer must turn to practical account every advantage within his reach bearing on the improvement, in the quality of his products and in lessening the cost of their production if he is to maintain and improve his position.

When the experimental farms were planned it was intended that they should become bureaus of information to which farmers could apply from time to time to aid them in the solution of difficulties which frequently present themselves during the progress of farm work. Evidence of their usefulness in this way is furnished in the rapid increase of the correspondence carried on with farmers in all parts of the Dominion. In 1889, the year after the farms had become fairly organised, the number of letters received was about 8,000. During 1899 there were received at the several experimental farms 69,669 letters, of which written replies were sent to 36,590, the remainder were of such a nature as to admit of their being answered by printed circulars. In addition 215,000 reports and bulletins were sent out. There is thus a constant flow of information going to Canadian farmers from all the experimental farms which is producing excellent results.

It is, as a rule, a difficult matter to bring about rapid changes in the ideas and practice of farmers, but as soon as they are convinced that experimental work is carried on in a practical manner by persons competent to give information, that it is undertaken in their interests and with the special object of making farming more profitable, their sympathy and co-operation is assured.

The subject of experimental agriculture covers much too large a field to permit of its being treated in a comprehensive manner in a single address. I can, therefore, but refer briefly to a few important points in connection with the work which has been done by the Canadian Experimental Farms, such as will indicate the general trend of the work and serve as specimens of the many lines of research undertaken.

The principles which underly successful crop-growing in Canada may be thus summarized :

Maintaining the fertility of the land, mainly by the proper care and use of barn-yard manure and the ploughing under of green clover, thus adding fertility and humus.

Adopting a judicious rotation of crops.

Following the best methods of preparing the land.

Early sowing.

Choosing the best and most productive varieties.

The selection of plump and well-ripened seed.

Along these several lines many experiments have been conducted.

Continued efforts have been made to gain knowledge as to the best methods of maintaining and adding to the fertility of the land. In this connection, special attention has been given to investigations to determine the best methods of handling and using barn-yard manure, the universal fertilizer which is more or less available everywhere to the average Canadian farmer. Experiments continued for eleven years have shown that a given weight of manure taken fresh from the barn yard is equal in crop-producing power to the same weight of rotted manure. It has also been shown by repeated tests that fresh manure loses during the process of rotting from 50 per cent to 60 per cent of its weight. The effective use of barn-yard manure so as to obtain the best results with the least waste is without doubt one of the most important problems connected with successful agriculture, for on this material the farmer's hopes of maintaining the fertility of his land and thus providing for a succession of good crops are mainly based.

During the past eleven years annual tests have been made to gain information on the relative value of artificial manures, used separately and in combination, on nearly all the more important farm crops, and the average results of this work have been published. These continued experiments with artificial fertilizers, used alone, have given results which are disappointing, considering the large proportion of available plant food they contain. One reason for this lies probably in the fact that these fertilizers contain no humus and that the proportion of vegetable matter in the soil has been much reduced by constant cropping. The capacity of the soil for holding moisture has been lessened, to the detriment of its crop-producing power.

Experiments have also been conducted for several years in the ploughing under of green clover to enrich the land, and it has been demonstrated that clover seed can be sown in all the eastern provinces of Canada and in the coast climate of British Columbia to advantage with all cereal crops, without lessening the grain crop for the current year, and that after the grain is cut the clover grows luxuriantly, acting as a catch crop during the latter part of the season. Green clover is specially valuable to the land, for the reason that it absorbs while growing large quantities of nitrogen from the air which is stored up in its tissues. A heavy mat of growth is produced by the autumn, which, when ploughed under, adds considerably to the available nitrogen in the soil as well as to the store of humus. The proportion of nitrogen thus added to the land has been found to be equal to that obtained from a dressing of 10 tons of barn-yard manure to the acre. Considerable supplies of potash, phosphoric acid and lime are also taken up by the clover plant during its growth, a part of which is gathered from depths in the soil not reached by some other farm crops. In this way the clover is practically an enricher of the soil to some extent in these other important elements.

That the land has been much improved by this treatment has been shown in increased crops on many plots, when compared with adjoining plots on which no clover had been sown. With the oat crop in one series of experiments, the average increase for the first year was 28 per cent in the weight of the grain produced and 78 per cent in the weight of the straw. In the second year, when barley was sown on the same series of plots without any additional fertilizer, the increase in the weight of grain produced on the plots which had been treated with clover was 29 per cent, and the increase in the weight of straw, 35 per cent. In a similar course of experiments conducted with potatoes, the plots treated with clover gave an average increase in the weight of the tubers of 28 per cent.

In preparing the land for crop different methods are adopted in different parts of the Dominion. In the eastern provinces the advantages arising from fall ploughing have been repeatedly shown. The exposure of the soil to the influence of frost, sunlight and air is beneficial, and spring work is materially advanced, and crops can be got in earlier by the general adoption of this practice. On the North-west plains it has been found of great advantage to 'summer fallow' a part of the land each year. This practice conserves moisture, destroys weeds and brings the farmer much larger crops. The yield of wheat on land which has been summer-fallowed will average fully one-third more than on land which has been prepared by fall or spring ploughing.

That increased crops result from early sowing has been fully demonstrated by the tests carried on at the experimental farms These experiments with early, medium and late sowings have been conducted for ten years on plots of one-tenth acre each on land very uniform in character. The same preparation has been given to the soil in each case and the same lots of seeds have been used for each sowing. Forty-eight plots have been devoted to this experiment, eight of which have been sown at the very earliest time practicable with two varieties each of wheat, oats, barley and pease. A second series has been sown at the end of a week, and others at the end of each subsequent week, until six successive sowings have been made. These plots have all been harvested and threshed separately and the result published each year. The best crops have been had from the second sowings, made just one week after it was possible to sow the seed; beyond this, delay in sowing has resulted in loss, which has become more serious as the delay has been greater. The average of the ten years' experiments shows as follows :—

With wheat a delay of one week beyond the period named has entailed a loss of over 30 per cent ; two weeks, 40 per cent ; three weeks, nearly 50 per cent, and four weeks, 56 per cent of the crop.

With oats a delay of one week has caused an average loss of over 15 per cent ; two weeks, 22 per cent ; three weeks, over 32 per cent, and four weeks, about 48 per cent.

In the case of barley a delay of one week has resulted in an average loss of 23 per cent ; two weeks, 27 per cent : three weeks, 40 per cent, and four weeks, nearly 46 per cent.

With pease the loss in crop from delay has been less. A delay of one week has lessened the crop to the extent of 4 per cent ; two weeks, 12 per cent ; three weeks, 22 per cent, and four weeks, 30 per cent.

The results of these experiments have led farmers generally to pay more attention than formerly to early sowing, and in this way crops have been improved.

Another important consideration in connection with successful farming is the selection of the best varieties of seed for sowing, taking into consideration productiveness, quality and earliness of maturing. That there are varieties more productive and earlier in ripening than other sorts has been abundantly proven.

During a five years' test of 41 varieties of oats, all of them sown each year on the same day, and on similar soil, the results have demonstrated the relative productiveness of certain sorts. Each year a list has been published of the best twelve in the series, and during the whole period of five years only fifteen varieties have found their way into this select list, and nine of the varieties under test have appeared among the best twelve every year.

Similar evidence has been furnished with spring wheat, thirty-one varieties of which have been under trial for a like period. In this instance sixteen of the thirty-one sorts have appeared among the best twelve during the five years' trial, and nine of the varieties have appeared each year in that list. In the case of barley the evidence furnished in this direction is still more striking.

In spring wheat the difference in yield between the different sorts under uniform conditions as to treatment has ranged from 31 to 16 bushels per acre. Oats from 89 bushels to 42 bushels, barley from 58 to 33 bushels, and pease from 46 bushels to 20 bushels per acre. The importance of taking advantage of this variation in yield, and of encouraging the growth of the more prolific sorts becomes more apparent when we consider the large area under cultivation. As an example, the addition of a single bushel of oats to the average crop of Canada adds to the profits of the Canadian farmers more than £200,000 or one million dollars.

After careful and continued experiments have shown that any variety is specially promising, such variety is cultivated on a larger scale, so as to admit of its free distribution among the farmers of the Dominion. This grain is grown on the experimental farms, and is distributed chiefly from the central farm at Ottawa, forwarded in small bags through the mail. The samples are sent on personal application only from 3 to 10 pounds being forwarded to each farmer. Only one variety is obtainable by an applicant each year, and with this restriction, the quantity sent from the central farm every year for the past three years has averaged over 60 tons. The applications received each season have averaged more than 30,000. Those farmers who take good care of the samples received usually have at the end of the second season sufficient seed for a considerable acreage, and henceforward have all they require for their own seed and some surplus to sell to their less careful neighbours. By this method these better varieties of grain are soon spread all over the country, and the average yield of the more important crops is thus increased.

In this way the farmer is directly benefited, and with the help of the reports and bulletins published by the experimental farms, he is kept informed of the general work in progress, and is brought into sympathy with it.

Many varieties of grain have been brought to Canada for test from nearly all the grain growing countries of the world. New sorts of wheat, barley, oats and pease have also been produced at the experimental farms by cross-fertilizing with the object of combining the good qualities of varieties, more especially with a view of obtaining increased vigour, greater productiveness, and an early maturing habit. During the past ten years more than seven hundred new sorts have thus been produced and tested, and among these there are quite a number of promising varieties. Experiments have also been conducted for a series of years to ascertain the quantity of seed grain most profitable to sow per acre, the depth in the soil at which it is most advantageous to place the seed in the different climates in the Dominion, and the relative advantages of sowing broadcast and with different sorts of drills.

The object lessons which have been given in the raising of fodder crops and the converting of these into ensilage, thus providing succulent food for cattle, have greatly stimulated the dairy industry, especially the manufacture of butter in winter ; also the fattening of steers, thus affording profitable employment for farm labour during the winter months. The experiments which have been conducted with reference to the economical production of butter of the highest quality, and the best management of milk to secure the most complete separation of the butter fat, have commanded much attention from those engaged in this special industry. The experience gained by the feeding of cattle, sheep and swine, and in the testing of those breeds especially adapted to produce the highest quality of beef, mutton and pork, has stimulated and aided the stock industries. The business in eggs and dressed fowls for the table, has also been advanced by the publication of results obtained from experiments conducted in the poultry branch.

The instructive experiments which have been carried on with many varieties of large and small fruits have served to show where these can be grown to the greatest advantage, and has been helpful in promoting fruit-growing over those large areas where the climate is so well adapted to the growth of fruits of high quality. By cross-fertilization on hardy wild forms new and improved sorts have been produced, some of which will, it is believed, be hardy enough to succeed in all those portions of the country where the climate is less favourable to fruit-growing. The information which has been given on the cultivation of vegetables and the varieties best suited to the different climates of the country has also proved of much value.

Experiments in tree planting were begun at all the experimental farms as soon as practicable after their organization. At the central farm twenty acres are devoted to forest experiments to determine the relative growth of the more important timber trees under different conditions. Sixty acres of the same farm are in use as an Arboretum where trees and shrubs from many countries are under test to detrmine how far they are suitable for growth in eastern Canada. Smaller areas are being devoted to the same purpose on the branch experimental farms. As the need for forest shelter is very great on the open plains in the North-west country special attention has been given to the encouraging of tree planting for shelter in Manitoba and the North-west Territories. About sixty to seventy thousand trees have been planted on each of the western experimental farms in shelter belts, shelter blocks, avenues and hedges, furnishing examples as to the best methods of planting and giving information as to the cost of planting per acre. To aid others in starting this useful work there has been distributed free through the mail, on application during the past twelve years, 1,261,000 young forest trees in lots of about 100 each, and more than 7 tons of tree seeds have been sent to settlers in sample bags of one pound each, every package containing sufficient to produce with reasonable care from 500 to 800 young seedlings. The results of this work are now everywhere apparent. On homesteads in almost every part of the North-west plains, there are small plantations of forest trees which afford shelter for buildings and stock; also for the growing of garden vegetables, small fruits and flowers, and at the same time make the dwellings of the settlers more attractive by converting bare and uninviting surroundings into pleasant ad sheltered homes.

The practical help which has been rendered by the officers who have charge of the more scientific part of the work has also been a source of satisfaction to the public. The information given by my colleague, Dr. James Fletcher, as to the best remedies for the destruction of noxious insects and for resisting the inroads made by fungus diseases from which grain, fruit and other crops have suffered has been much appreciated, and the good results obtained from the use of the measures recommended have been very satisfactory to farmers and fruit-growers. The subject of noxious weeds has also been fully investigated and the best measures pointed out for their subjugation.

In the chemical division, under the charge of Mr. F. T. Shutt, investigations have been conducted to determine the nutritious constituents in many fodder plants which have been analysed at different stages in their growth to ascertain the period when these plants may be cut to the greatest advantage. The farmers of Canada have profited much from this valuable information. In many other lines of chemical research bearing on agriculture much useful information has been given regarding the care of and the action of manures, the usefulness of mucks, muds and marls as fertilizing agents, on the composition of soils in different parts of the Dominion and on many kindred subjects.

Much information is given each year by the agriculturist, the horticulturist, the poultry manager and other officers of the central farm. Also by the superintendents and other officers of the branch farms who attend meetings of farmers held in all parts of the country where opportunities are afforded of giving fuller explanations concerning all branches of the work in progress at the several experimental farms.

In the meantime the occupation of farming has been elevated in the eyes of the community. It is no longer looked upon as a drudgery suited only to the dull and slow going. It is now regarded as a suitable field for the exercise of the higher intelligence of more cultivated minds, and is recognised as a calling requiring much skill to conduct it successfully.

A few figures will illustrate the progress made along some of the lines referred to. The exports of wheat and flour have assumed large proportions. In 1884 the value of the cheese export from Canada was £1,450,397 ; in 1898 it was £3,512,553. During the same period the value of the butter exported has nearly doubled. The exports of cattle have also increased considerably. The trade in pork has made a phenomenal growth. In 1884 the value of the exports of hams, bacon, pork and lard was less than £200,000; in 1898 it amounted to more than £1,600,000. The increase in the exports of many other agricultural products have also been most encouraging.

DISCUSSION FOLLOWING ADDRESS.

An interesting discussion followed the reading of this paper from which some extracts are given.

'Professor Somerville (Professor of Agriculture at Cambridge) thought they were greatly indebted to Dr. Saunders for an interesting and exhaustive paper, which had come at an extremely opportune time. Many persons in this country had for the past few years been endeavouring to formulate a suitable scheme for the improvement on scientific lines of agriculture in England, Scotland and Ireland, and those who were engaged in this work had kept their eye carefully on what was being done on the other side of the Atlantic—in the United States as well as in Canada. As the head of the experimental work in Canada, Dr. Saunders had given to the world, in his annual report, yearly a volume that described exhaustively the experimental work of the Dominion, and they in England had derived great benefit from the perusal of this work. Canada had begun her experimental work on thorough and complete governmental lines, and at first it did not seem as if it would lead to very satisfactory results, for experiment by Act of Parliament looked to be a very cast-iron mode of procedure, but practically the experiment had resulted in an entirely free hand being given to those appointed to carry on the work, with very excellent results. In this country the work had been suported by the government to some extent, and it had greatly benefited from that support. The great difference, however, between Canada and this country was that here they looked more largely to local effort. Practically there was no experimental or educational work of an agricultural character in this country entirely maintained from government sources. One of the conditions under which government support was given was that the localities themselves where the work was carried on showed sufficient interest in the work to warrant the government in giving substantial support. They knew how difficult it was to excite local interest, especially in an agricultural community, in work of that kind, but if they could get local farmers upon the committees, they would bring them into closer contact with the work, and valuable information would be disseminated throughout the district. Though the work in this country had only been systematised since 1890, a great deal of experimental work had been done as far back as the end of the last century. Individual workers had carried out an enormous number of experiments in the last quarter of the last century, which had been described in a number of volumes. Then, the old Board of Agriculture came into existence in 1792 and expired in 1819, and the presidents of that Board had always strongly insisted on the value of experimental farms as an aid to agriculture. But between the early years of the present century and the year 1890 very little experimental work had been done with government support. In 1890, however, they had started on a new era, and the amount of work put in during the last ten years had been fairly satisfactory. They had yet much to learn as regarded the best lines of procedure, but they were now fairly well settled down to steady work. The line they were following was to have a central establishment with institutions distributed throughout the country.

EXPERIMENTAL WORK IN ENGLAND.

'At present in England there were eight or nine institutions that received government support in the shape of annual grants. These grants, supplemented by local support, were sufficient to provide a staff of instructors and also facilities for the conduct of experiments. The educational work was carried on on orthodox lines, and the experimental work was devised and carried out on the initiative of the workers at the various centres. The results achieved during the last few years had been very extensive and had led to a belief, on the part of the farmers themselves, that the work was of distinct value to agriculture. But the value of the work was not so much in the way of placing models and examples, as it were, before the farmers as in making the farmers think in a way they had not thought in the past. Agriculturists, if they were not stirred up in some way, were apt to go along on lines that they had followed in the past. In many cases these lines were satisfactory, but also in many cases it was likely that improvements would be effective. When the farmers saw that these improvements led to better results, they began to devote more intelligence to their business. He considered that the work done in Canada was extremely valuable to farmers in this country, and he believed great advantage would be derived from the improvements in the varieties of cereals and other plants. In the United States, also, especially in Wisconsin, valuable work had been done in the direction of improving the yield of cereals, not by extending the area planted, or by better manuring and tillage, but entirely by introducing new varieties of seeds. The improved yield from new varieties was often perfectly astonishing, and that without any increased expenditure on labour or manure. With regard to the advantages Dr. Saunders found could be derived from growing clover along with cereals, that was a point that had strongly been insisted upon by Humphrey Davy in the first decade of the present century, but he (the speaker) did not think the practice would be of value in this country, for the simple reason that the best farmers here hoed their wheat, and of course it was impossible to hoe the wheat if the clover plants were sown along with it. He did not propose to make any attempt to criticise Dr. Saunders's paper, which deserved the most careful consideration, and would no doubt prove of very great value to English agriculturists.

'CANADIAN FARMS.

'Professor A. D. Hall (Principal of the South-Eastern Agricultural College, Wye) said that after Dr. Saunder's description of the work of the Canadian experimental farms, the feeling of agriculturists in this country must be one of envy. In Canada they saw a great scheme started in a great way by the government. They put the whole thing in the hands of competent experts, and they found a great scheme started in all its details suited to meet the wants of the country. Such a scheme was bound to succeed. He could not help comparing that with the haphazard, casual way in which things had been done in this country. It was not that the English landowner and farmer were not interested in experimental work, or had not initiated such work, because some of the very best experimental work had been done for years in this country by individuals and voluntary societies, but, as he had said, the work was of a casual, haphazard kind. Very good work had undoubtedly been done by the Royal Agricultural Society, and the establishment of the magnificent experimental institution at Rothamsted was entirely due to private initiative. By these means a good start was made, and a further impetus was given to the work ten years ago, but the fact that the work was scattered about, was under the control of various authorities, and was partly voluntary, while important vested interests had sprung up in connection with it, had prevented the State from stepping in and elaborating a scheme that would completely cover the whole ground. He could not agree with Professor Somerville that there was any great amount of good work being done. They were still experimentalising, but outside Rothamsted there was very little of pure research going on in this country. It was possible only by governmental initiative, with the weight of a great department to carry on the work, to create and continue a real research station, which could work, as it were, in the dark for a long period before they could expect to bring about good results. There was another point in which it struck him Canada had secured a great advantage: they had disassociated the teaching side from the experimental side. In this country we were making the mistake of supposing that the two things of teaching and experimenting should be in the same hands. It seemed to him to be impossible to have an educational and a research station together unless there were absolutely separate staffs. The teacher conducted his operations from an educational point of view, and having due regard to the interests of his pupils, but this attention to the needs of the pupils prevented research being properly and thoroughly carried on. If they wanted an experimental station of the best type, they must have a separate staff, giving up the whole of their time to the work. Dr. Saunders's paper would help to clear up their ideas on the subject. Local authorities in this country who largely controlled the work, very much wanted to have clearer ideas as to what was required. At present the work was chiefly educational, and mostly consisted of demonstrations to the farmers of such improved methods as were generally known, and there was little of real experimental work, such as was done at Rothamsted. Until we were able to separate these three departments of the work—the educational, the demonstrative, and the experimental—from each other, they would not make much progress.

'The President, in closing the discussion, said that of course the circumstances of one country differed enormously from those of another country with regard to the methods by which experimental work could be initiated and carried on, and no doubt in a new country where the occupants of the land were scattered far apart, with little individual co-operation, the influence of a central power was essential to the starting of experimental work. As Professor Somerville had explained, it was not the practice in this country to begin work of that kind with State help, but for the State to come in and supplement the work of individuals and voluntary societies. But it should be remembered that the State had lately taken a very long step in the direction of enabling the local authorities to carry on work of this kind—not wholly research work, it was true, but work of a demonstrative character, giving the farmers an object lesson as to what could be done, and what the individual experimenters had worked out in the past. After all, when the State diverted large funds to the assistance of the County Councils to enable them to carry out technical education in all its branches, an important step was taken to place in the hands of the local authorities the power to carry on this experimental agricultural work. There were many points in Dr. Saunders's paper which contained suggestions that were of great value to agriculturists in this country, and they were certainly greatly indebted to the author of the paper for the great amount of time and labour that he had devoted to its preparation.'

VISIT TO FRANCE.

At the close of the meeting of the British Association I went to Paris. I was very favourably impressed with the Canadian exhibits, and particularly so with the agricultural and horticultural collections which I had the responsibility of bringing together.

The exhibits of grain, both in straw and cleaned, were very fine, and attracted deserved attention. The brightness of the straw and the plumpness of the grain spoke volumes for the climates of this country, and the taste with which these and other agricultural products had been displayed excited general admiration.

CANADIAN EXHIBITS OF GRAIN AND FRUITS AT THE PARIS EXHIBITION.

This collection owed much to the experimental farms. From the branch farms at Brandon and Indian Head many of the most attractive sheaves of grain in the straw, and some of the brightest samples of grain, had been sent. Good specimens had also come from Agassiz, B.C., and from Nappan, N.S., with a large quota from the Central Farm. All the officers in charge had used their best efforts towards success, and the results were good, and much credit is due to Mr. W. H. Hay, the accountant of the farm, for the tasteful manner in which he placed the material, and the skill used in disposing of it to the best advantage.

The agricultural exhibits were not, however, by any means confined to the material from the experimental farms. Good exhibits were prepared by most of the provinces ; a large number of farmers also contributed to this work from all parts of the Dominion.

The exhibits of fruit were also a great success. Some 1,200 glass jars, filled with beautiful specimens of our more perishable fruits, reached their destination safely. The largest contribution in this section was from Ontario, and the collection gathered from the fruit-growing districts in this province was put up chiefly at Guelph, under the direction of the Horticulturist, Professor Hutt. The Horticulturist of the Central Experimental Farm, Mr. W. T. Macoun, prepared a fine exhibit of the more perishable fruits grown here, and Mr. R. B. Whyte contributed some of the finest specimens from his large garden in Ottawa.

In Nova Scotia collections were made in the Annapolis Valley and by the Horticulturist at the Experimental Farm at Nappan ; some specimens of fruit for preserving also came from Prince Edward Island. Quebec was well represented in her more perishable fruits, both from the eastern and western sections of the province, and many fine samples were sent from British Columbia by Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm at Agassiz. Many of these had been grown on that farm, and some were produced on the farms of other growers in the Fraser River valley.

Large quantities of fresh fruits of late-keeping sorts were forwarded from the fruit-growing districts in Ontario, Quebec, Nova Scotia, British Columbia, New Brunswick and Prince Edward Island, and put in cold storage, and from these supplies, well preserved and handsome specimens of nearly all of our best varieties of winter apples of the growth of 1899 were available for display until the close of the exposition in November, 1900. Early in October a large supply of fresh fruits were received—the growth of 1900. These were followed by further shipments, including many varieties of excellent apples, pears and peaches. These added very much to the attractiveness of the exhibit and kept up the general interest in it to the end. In plate 2 a view is given of a part of this display. Such continued success has never before attended any exhibit of fruit, and the number of awards received from the international jury is a gratifying evidence of the appreciation in which these exhibits were held.

THE POMOLOGICAL CONGRESS.

At this important gathering, held in Paris from September 12 to 14, Canada was represented by Mr. A. Dupuis, Secretary of the Canadian Commission for Paris, and the writer. We were both honoured by being invited to the platform and introduced to the large assembly as Canadian representatives. There was a large and distinguished gathering, including eminent pomologists from nearly all the civilized countries in the world. Many interesting papers were presented, which were followed by animated discussions. Among the subjects discussed were the planting of fruit and forest trees on the roadside, which brought out much difference of opinion; the weight of evidence, however, was in favour of using fruit trees for this purpose. The replanting of orchards, the trenching of land, the use of fertilizers on fruit trees, the cultivation of the banana in the French colonies, and the teaching of agriculture and horticulture in the public schools were all discussed. This latter subject called out much difference of opinion. The results of this teaching were commented on favourably by some, while other speakers were of opinion that the progress made by the pupils had not, on the whole, been satisfactory, and it was only where the teachers themselves took a great interest in the subject and imbued the pupils with some of their enthusiasm that much real progress was made, and that the number of teachers so interested was comparatively small.

A paper was presented by Mr. A. Dupuis on 'Horticulture in Canada,' which was very well received. The proceedings of the congress lasted nearly three days, and was well attended throughout.

I also attended the Congress of Botanists, where Canada had three representatives : Mr. James M. Macoun, Assistant Naturalist of the Geological Survey ; Mr. Robert Hamilton, of Grenville, Quebec, and myself.

AGRICULTURAL COLLEGE AT GRIGNON.

A visit was paid to this excellent and well-known National Agricultural School, in company with Dr. Jas. Mills, President of the Ontario College of Agriculture at Guelph, and others. The college at Grignon has commodious buildings and is thoroughly equipped for teaching purposes. It is well supplied with apparatus and material suitable for chemical and physical demonstrations and for the teaching of agriculture and botany. Good examples were also seen of animals belonging to different breeds of stock.

After inspecting the buildings, we visited the fields where experimental work was in progress, and found everything nicely arranged. The series of experiments were well planned and instructive, all calculated to serve an excellent purpose in the instruction of the students. Experiments are conducted with many different sorts of wheat, barley and oats, but the grain plots were all harvested. Samples, however, were shown us in the building, both in straw and cleaned grain. Rotation plots are carried on. Comparative tests were in progress as to the relative value of farm manure and lupins and vetches, ploughed under. Other experiments were also being made with fertilizers. About 230 acres of land, in all, are used for the purposes of this college. The number of pupils in 1900 was 220, 100 of which are boarders; the others live outside the college. About 25 per cent of the pupils are farmers' sons. Fifty varieties of sugar beets were under test in plots of about 8 by 10 feet. Experiments were also in progress with potatoes, using for seed a medium-sized whole potato, as against the half of a large-sized potato. No reports or bulletins are published. Farmers generally are not encouraged to visit this school. The school is established especially for students and for the advancement of scientific work in connection with agriculture, but no means seem to be adopted to make farmers acquainted with the particulars of the work in progress.

VISIT TO NORMANDY.

A journey was made into Normandy to the district of Calvados to inspect one of the large tree-growing establishments for which this district is celebrated. The firm whose place I visited work about 100 acres in all, and grow young trees and shrubs by the million. About 110 men are employed, and the wages paid are from 50 to 80 cents a day. The larger number of hands receive the lower wage, the more skilled workers 60 cents, and a very few only of the men most skilled in grafting, budding and propagating receive 80 cents per day. The hours for work in the nursery firms in that district, of which there are a large number, are as follows:—From April 1 to October 1, from 5 a.m. to 7 p.m., with 2 hours in all off during the day for meals. From October 1 to November 1 the hours are from 5.30 a.m. to 6.30 p.m., and from November 1 to April 1 they range from 6.30 a.m. to 6 p.m. Some women are also employed in weeding the beds of young trees and nursery stock, which are about 6 feet wide and 50 to 100 feet or more in length, with narrow paths between them. This weeding is all done by hand, the only tools I saw used were the fingers, and the workers receive 30 cents per day; they begin to work at 8 a.m., but the hours for closing are the same as those for the men. The general wages paid to labourers by farmers in this district is 30 cents per day and board. The hours of work in summer are from 4 a.m. to 8 p.m., with two hours rest at noon. The board is very plain, and consists mainly of bread and soup three times a day, with a more or less liberal portion of Normandy cider. There are no holidays or saints days kept by the labouring people in Normandy, and they are only paid for the days they actually work. When employed by the year they occasionally get a day off, but this is a rare thing, and when employed in this way they are expected to do such work as is needed on Sundays, such as the watering of seed beds, &c.

The people look robust and very healthy, and seem quite contented. With such low wages, long hours for labour and an admirable climate for propagating, it is not surprising that young trees and shrubs can be bought in this district at very low prices.

Where men have served the same employer for 25 to 40 years, their cases are reported to the government by the municipal officers, when the government gives medals, which are much prized by those receiving them. The foreman at the nursery visited has been employed by the firm for 26 years, and the secretary for 25 years, and both of these employees had recently received medals.

AT THE VILMORINS AT VERRIERES.

A delightful day was spent at the home of the Vilmorins at Verrieres, a few miles from Paris, in company with Mr. Philippe de Vilmorin, the accomplished son of the late Henry Vilmorin, well known throughout the civilized world for his researches in agriculture and horticulture.

Many magnificent trees are growing about the home, especially cedars of Lebanon, which were decorated with their handsome bright cones. Some rare pines and spruces were seen, now grown to be large trees, the seed of which was planted by the grandfather or great grandfather of Mr. Philippe. A very interesting hybrid was seen, a cross between *Abies cephalonica* and *A. pinsapo*, intermediate in form between these two species. There were also hybrid walnuts, and many other interesting cross-bred trees.

The grain on the experimental plots had all been harvested. The plots were small, but very numerous, each of which contains from 40 to 50 plants of the variety under trial, with sufficient space between them to permit of strong growth. At harvest time two of the best and most productive of the plants are selected for seed and the remainder discarded. No attempt is made to cultivate any of the varieties on trial on a large scale until such variety has shown itself to be of special promise.

The plots during 1900 numbered about 2,500. Of these 1,000 were wheat, 900 of which are named varieties of winter wheat, including about 250 hybrids. There were also 150 varieties of spring wheat, about 100 varieties of barley and nearly 150 different sorts of oats. A few varieties only of each class are grown on a larger scale for commercial purposes.

In shrubs and flowers there were many interesting things. Among the flowers were magnificent beds of Japanese anemones and of the European cyclamen, both in full bloom. Much use was made of some of the free flowering begonias, the large beds of which were very fine and full of bloom. One of the most striking of these was *Begonia gracilis semperflorens*, of which there are rose-coloured and white varieties and one red strain called *Vernon*.

One of the most attractive flower beds seen was one of the original form of the China aster, as found growing wild in China. This is a single flower with bright blue petals and a large yellow centre, and is a most profuse bloomer. It seems singular that after florists have worked on this flower so much during the past half century, and have produced so many varied and beautiful forms, that the original type so long neglected should come back to us now as a first-class novelty.

The time was all too short to permit of more than a passing glance at a part of the wonderful variety of economic and interesting botanical products with which this charming place abounds.

AT BARON ALPHONSE ROTHSCHILDS.

On invitation from Col. G. B. Brackett, in charge of the fruit exhibit of the United States, a day was delightfully spent with him and others in inspecting the estate of Baron Rothschilds at Ferrieres, 20 miles from Paris. The estate covers an area of 6 by 20 miles, the greater part of which is used as a large game preserve, where deer and other animals are abundant, and where game birds are seen at every turn. Twelve hundred acres of this area is maintained in the most perfect manner as a park, where a vast number of species and varieties of trees and shrubs find a home. The great masses of Rhododendrons, Laurels, Yews, Aucubas, Hollies, Box and other comparatively tender things, all in the highest condition of health and vigour, demonstrated the highly favourable character of the climate of that district. The most striking feature about this beautiful park is the perfection in which everything is kept ; among the many thousands of trees and shrubs no unsightly forms are met with, and no evidence of sickliness, partial defoliation or neglect, but every specimen retains the original grace and beauty with which it has been endowed by nature, and every object is so placed as to give it sufficient room to grow without crowding. The wealth of varieties was wonderful. The unusual care shown in every particular was evident from the fact that the little lakes and ponds, in which wild water-birds of many sorts disported, had their surface skimmed several times a day by men in boats, to remove fallen leaves which at that time were dropping freely from the overhanging trees. The displays of tropical plants and the massive flowers beds about the palace-like mansion were very effective.

About 400 men were employed on these grounds, which furnished help sufficient to keep every department in good order. There was a very good aviary, with several buildings specially constructed to suit the habits of the hundreds of different sorts of birds kept there. The fruit garden was a perfect paradise: forty men were employed in it. There were wonderful collections of pears, peaches, nectarines and apples, most of them in full fruit. Many of the trees were trained against walls, but a very large number were grown as cordons, espaliers and pyramids, and nowhere could a misshapen branch or an unnecessary twig be seen, but every specimen was trained on the most approved principles, and the trees were laden with fruit.

The vegetable garden, which employed 25 men, covered a considerable area, furnishing ample room for the growing of all sorts of vegetables in the open air, while hot-beds and green-houses were available for the growth of such as were too tender to stand outside exposure, and for the growing of vegetables out of season.

There were splendid green-houses for orchids, roses, ferns, carnations, palms and other plants requiring special temperatures and treatment, where every species was grown under the most favourable conditions, and other houses provided where the less tender material was produced in abundance, for outside decoration. It had never been my good fortune before to see grounds so superbly planted, and so remarkably well kept, and the few hours spent there were most delightfully instructive, and produced impressions which will never be effaced from memory.

JOURNEY TO ST. NAZAIRE AND BAULE.

A journey was made to the sea coast of Brittany in company with Col. F. F. Gourdeau, Deputy Minister of Marine and Fisheries, to see the results of the planting of pine forests there on the drifting sands along the ocean shore. The object of the visit was to gain information as to the probable usefulness of such planting if undertaken in Canada on similar areas where moving sands are encroaching on arable land.

Our route lay through the large sea port St. Nazaire to Baule, a thriving town built on the margin of a beautiful beach which extends in the form of a deep crescent for five or six miles. The water is shallow for a long distance out and the beach is a hard smooth sand. The whole district about here has been planted with pines where formerly it was bare and barren, and a mass of drifting sand. The plantations extend for many miles. The trees are almost all of one species Pinus maritima (=*P. pinaster*) known as the cluster pine. This is a small growing pine with large long leaves and very large cones. The trees in this district seemed to be from twenty to fifty years old or more. Their height was from 15 to 25 feet, and the diameter of some of the larger specimens, 3 feet from the ground, was about 12 inches.

M. Berthot is said to have been the planter of these pines ; the work was begun about sixty years ago and it is reported that this gentleman's family have become wealthy owing to the increase in value of the planted land.

In planting, the trees have been set out in groups of six to ten or more and placed about 2 to 3 feet apart each way, with wider spaces of 6 to 12 feet between the groups. The planting and grouping has been done irregularly, but has been so arranged as to thoroughly break the force of wind. From the bent and gnarled condition of some of these trees at outlying points it is obvious that the winds have great force here.

The planting has been entirely successful ; the drifting of the sand has long since ceased and a soil is gradually but slowly forming, mainly through the decay of successive crops of the needle-like leaves of the pines.

THE MUSHROOM CAVES.

Some hours were spent in the mushroom caves which run under parts of Paris. The entrance to these caves is outside the Orleans gate. These excavations which have been made to obtain building stone for the city are very extensive. The stone is found in layers from 30 to 50 feet below the surface, and the quarries have been worked for ages. The mushroom beds are built up about 2 feet high, 18 or 20 inches wide and rounded off at the top, with narrow paths between them. Earth mixed with stable manure is used in their construction. When the heat of the fermenting material is reduced to the most favourable temperature pieces of mushroom spawn are introduced at stated distances all through the beds, and in the course of two or three weeks mushrooms begin to appear all along the tops and sides of the beds, and are produced in quantities from day to day.

There are about 150 growers engaged in this work and several of the larger operators produce as much as 2,000 pounds of mushrooms per day. After a time the beds become exhausted when the material is carted away and fresh beds made in their place. This industry is a very interesting one, and with the requisite experience and skill seems to be a profitable undertaking.

Plate 2.—Part of Exhibit of Canadian Fruit at the Paris Exposition.

AGRICULTURAL DISPLAYS AT THE EXPOSITION.

At intervals while in Paris, when not occupied by official duties, time was found to examine carefully most of the agricultural exhibits at the exposition. Objects of interest were noted and many new varieties of cereals and other farm crops from different countries were secured for experimental test in Canada.

CORRESPONDENCE.

The following is a summary of the letters received and sent out at the Central Experimental Farm, from November 30, 1899, to November 30, 1900. Also the number of reports, bulletins and circulars forwarded by mail during the same period :—

	Letters received.	Letters sent.
Director	42,239	18,495
Agriculturist	1,476	2,127
Horticulturist	1,185	1,332
Chemist	1,026	1,453
Entomologist and Botanist	3,017	2,847
Poultry manager	1,590	870
Accountant	1,001	1,431
Totals	51,534	28,555

A large number of the letters received by the Director are applications for the publications of the farms or for samples of grain. A large proportion of these are answered by sending what is asked for. This will explain why the number received so much exceeds the number answered.

Circular letters sent, including circulars sent with samples of seed grain	39,183
Number of reports and bulletins mailed	194,073

ACKNOWLEDGMENTS.

Grateful acknowledgments are due to the director of the Royal Gardens, Kew, England, for another useful and interesting collection of the seeds of shrubs, trees and plants from northern countries. Also to the director of the Arnold Arboretum, for seeds of some rare and promising trees and shrubs. To the Department of Agriculture at Washington, U.S.A., I am indebted for many different sorts of seeds, especially cereals and vegetables ; also to Prof. John Macoun, naturalist of the Geological and Natural History Survey, and to Mr. J. M. Macoun, my thanks are due for seeds of interesting native species, collected in different parts of Canada.

I beg also to acknowledge the faithful service rendered by all the officers of the central and branch experimental farms, and for their earnest co-operation in carrying out the many lines of experimental work planned.

Hearty thanks are also due to those members of the staff at Ottawa who have rendered me efficient help in those branches of the work in progress there of which I have had personal charge. To the horticulturist, Mr. W. T. Macoun, who has supervised the labour given to the lawns, and to the trees and shrubs planted on the ornamental grounds ; to the farm foreman, Mr. John Fixter, who has carefully watched over the different branches of the work, taken special charge of the fertilized plots and the larger field plots on the experimental grounds, and has aided me much by his practical suggestions and accurate notes ; to Mr. Harry Fixter, who has managed the work connected with the experimental plots of cereals, fodder plots and field roots, and has taken records of the growth and yield of all the varieties grown in the uniform trial plots. I am also indebted to him for the careful management of the many details connected with the distribution of samples of seed grain and potatoes ; to Mr. Wm. Ellis my sincere thanks are rendered for his careful work in testing the vitality of seeds, in the management of the green-house plants, in the propagation of the many useful and ornamental species, and in the taking of the meteorological records. In every branch of work the employees of all the farms have faithfully discharged their duties.

WM. SAUNDERS,

Director Experimental Farms.

REPORT OF THE AGRICULTURIST.

(J. H. Grisdale, B. Agr.)

Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith reports on Horses, Dairy Cattle, Beef Production, Pork Production, Sheep, and Farm Crops.

During the year, I have attended a number of meetings in Ontario, Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Manitoba.

I am indebted to Mr. John Fixter, farm foreman, and Mr. C. T. Brettell, herdsman, for assistance in the work carried on as well as for help in the preparation of the submitted report.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

HORSES.

There are in the farm stables at present fourteen horses. A number of these are quite old and will need to be replaced at an early date. During the year, one horse has died. His death was caused by colic. A new team was purchased in April and has proven entirely satisfactory.

Three of the above horses are required for the omnibus which runs from the farm to the city, making three trips daily. One is used for a driver and two for cart or general jobbing horses.

The remaining eight horses constitute the teams for general work upon the farm, in the gardens and orchards, upon the lawns and in the arboretum, as well as for cartage. This number of horses has, during the past year, proven to be very far short of the requirements as detailed above, and another team is very much needed.

On March 6, 1900, an experiment in feeding work horses was incepted, the end in view being to ascertain the comparative economy of feeding whole as contrasted with ground grain, also the gaining of some data as to the comparative value of oats, barley and corn as grain rations for working horses. A uniform ration of 12 pounds per diem was adopted to permit of comparing results. The experiment was discontinued after May 6, as it was found that on the heavy spring work a more varied and better ration was required than was being fed some of the horses.

It will be observed that in feeding ground vs. unground grain, the ground grain was fed to old and the unground grain to young horses.

LOT ON WHOLE GRAIN, 12 POUNDS—OATS AND BARLEY.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Polly	Oats 10, Barley 2	1,270	1,230	1,230	40	Unusually heavy work part of time.
Dolly		1,390	1,382	1,402	12	

These two animals were seven and eight years old, respectively. They continued in excellent health throughout the time of the experiment.

LOT ON GROUND GRAIN, 12 POUNDS—OATS AND BARLEY.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Rock	Oats 10, Barley 2	1,460	1,455	1,495	35	
Daisy		1,345	1,410	1,350	5	Idle part of time in March.

While this team lost considerable in weight during the time of the experiment, they continued in good health. They were in better working condition at the end than at the beginning of the feed test. Rock was eighteen years old, and Daisy twenty-one.

LOT ON CORN AND OATS (GROUND), 12 POUNDS.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Fanny	Corn 6, Oats 6	1,670	1,645	1,655	15	
Ben		1,575	1,575	1,512	63	

Fanny was seven years old, and Ben fifteen. In spite of 12 pounds per diem, a very light ration for such heavy horses, they appeared to thrive upon it. After the ration was increased they did better, however.

LOT ON GROUND CORN, 12 POUNDS.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Charlie..............	Corn.. 12	1,315	....	....	....	Went off feed in eight days.
George...............	"	1,450	1,395	1,455	5	

Charlie, aged twenty, and George twenty. Charlie could not stand this ration, and so dropped out of the experiment in a short time. George, as appears above, did well upon this ration in spite of the too great proportion of starch and fat.

PURE BRED BREEDING CATTLE.

There are on the farm at present representatives of two breeds of cattle : Ayrshires and Guernseys.

Ayrshires.

1 bull, 'Matchless Again' (8757)............... ....2 yr. old
1 cow, 'Darling'....... ....2 yr. old
1 calf, bull....... ....3 mos. old
1 calf, heifer....... ....8 mos. old

Guernseys.

1 bull, 'Wedgewood' (5,113)......... ....6 yrs. old
1 cow, 'Ruby'....... ....2 yrs. old
1 bull.......... ....2 yrs. old
1 calf.. ....6 mos. old

It is proposed to secure a few more females of each breed represented, and of a milking strain of Shorthorns. Small herds of pure bred animals of each of the three breeds will be maintained, and small graded herds of the respective breeds as well. It is hoped to gain some data as to the exact value of bulls in grading up a herd in a given time.

The services of the stock bulls are available to farmers upon payment of a moderate charge.

DAIRY CATTLE.

The herd of dairy cattle consists of 31 females, all told. They are :—

Milking Stock.

Ayrshires...... 1
Guernseys... 1
Canadian grades.. 5
Ayrshire grades...... 6
Other grades 7

Young Stock.

Two-year olds	5
Yearlings	2
Calves	4

During the year some of the older and less valuable cattle have been sold to the butcher.

The dairy cows have been fed a roughage ration of corn ensilage 35 pounds, chaff 3 pounds, hay 5 pounds, and mangels 20 pounds daily; some more, some less, according to ability to use food profitably.

The meal ration varied in quantity on the same principle, some cows getting as low as 2 pounds per diem, while in milk, and others eating as much as 10 pounds per diem. The meal ration mixture was made up of bran ½, oats 1-6, peas 1-6, and barley 1-6, in most cases, but was varied to suit individual tastes and requirements.

Much attention has been paid to the individuality of the animals, with marked results. The average yield of butter and milk has increased materially over last year, namely, from an average of 242·5 to 289·6 pounds butter, and from 5,414 to 6,455 pounds milk. This is due in a great measure to larger returns from individuals of the herd, but to a certain extent to the weeding out process, which has been most rigorously pursued, no animal falling much below last year's average being allowed to remain in the herd, heifers of course being excepted.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the local market rates for the same save in the cases of roots and ensilage, which are charged at the usual values affixed in experimental work:—

Pasture	$1 per month
Bran	$15 per ton
Oats, barley and pease	19 per ton
Chaff	4 per ton
Clover hay	5 per ton
Roots and ensilage	2 per ton

In estimating the cost of feeding heifers, they were charged for that part of the year during which they were milking, while other milkers were charged for the whole year. While dry, cows were charged at the rate of $2 per month in winter and $1 per month in summer.

The average cost of feeding has been materially reduced from last year by selection, by the feeding more freely of cheaper feed stuffs and by studying the individuality of the cows.

In estimating the value of the product, 19 cents is allowed for a pound of butter, and 15 cents per 100 pounds of skim-milk and buttermilk. The butter is manufactured in the farm dairy, and sells on the market at from 22 to 30 cents per pound, an average of about 24½ cents. This leaves 5½ cents per pound for cost of manufacture.

The following tables will be of interest, as showing the records of the individual cows, and giving some general results :—

Number.	Cow.	Breed.	Days of Milking.	Lbs. Milk.	Per cent of B. Fat.	Lbs. Butter.	Total Value of Product.	Cost of Feed.	Profits.
							$ cts.	$ cts.	$ cts.
1	Dewdrop	Ayrshire Grade	350	10,595	3·4	436·25	97 35	40 85	56 50
2	Julia		364	9,314	3·7	408·75	91 17	40 75	50 42
3	Della	Shorthorn	327	8,548	4·0	411·60	90 35	40 90	49 45
4	Begonia	Canadian Grade	267	8,975	3·6	385·80	86 05	39 30	46 75
5	Belle	Ayrshire "	316	8,429	3·7	371·40	82 56	39 25	43 31
6	Dora	" "	354	9,760	3·1	358·33	82 10	40 85	41 25
7	Polly		330	7,591	3·8	345·33	76 41	37 00	39 41
8	Gipsy	Ayrshire Grade	294	7,506	3·4	307·10	69 15	38 90	30 25
9	Forest Girl	Shorthorn "	329	6,834	4·0	324·50	69 40	38 90	28 50
10	Dairy Maid	" "	349	5,650	4·7	314·70	67 74	40 90	26 84
11	Tulip	Canadian "	271	4,342	4·7	242·50	52 22	25 50	26 72
12	Norette	" "	251	6,418	3·3	275·50	61 34	35 60	25 74
13	Florence	Shorthorn "	315	6,141	3·8	278·60	61 63	36 90	24 73
14	Theresa	Canadian "	319	5,852	4·0	281·50	61 73	37 00	24 73
15	*Ruby	Guernsey	197	3,272	4·9	188·90	40 54	17 00	23 54
16	Bloom		286	6,967	3·4	279·33	63 06	41 00	22 06
17	*Laura	Ayrshire Grade	269	4,212	3·5	180·90	40 37	22 00	18 37
18	May Belle	Shorthorn "	282	3,834	3·0	169·33	38 57	33 75	4 82
19	*Darling	Ayrshire	55	1,381	4·0	62·50	13 82	9 50	4 32
20	Hazel	Canadian Grade	222	3,479	4·0	169·20	37 09	36 20	0 89
							1,282 65	694 05	588 60

* Heifer.

—	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	Total.
Lbs. of milk	7,381	8,918	8,846	11,081	11,994	12,311	15,850	12,804	12,383	10,255	9,752	7,523	129,100
Lbs. of butter fat	324·61	335 38	317·94	429·61	374·89	438·55	542·81	475·78	455·89	411·28	420·86	337·84	4,865·44
Per cent butter fat	4·37	3·76	3·69	3·87	3·13	3·56	3·59	3·71	3·68	4 01	4·30	4·48	*3·76
Lbs. of butter	386·50	399·33	378·50	511·33	446·33	522 00	646·20	566·40	542·70	489·50	501·03	402·20	5,792·02
Lbs. of milk for 1 lb. butter	19·1	22·3	23·4	21·7	26·9	23·6	24·5	22·6	22·8	20·9	19·4	18·7	21·9

*Average.

Time of Milking Experiment.

The question of the effect of milking cows at equal or unequal intervals is one which frequently presents itself, and a small experiment along this line was conducted during the month of November. Below is submitted a particularized report of the results, while a general report or summary follows :—

TIME OF MILKING EXPERIMENT.

Period.	November.	Hours of Milking.	Darling. Morning Milk.	Darling. Morning p.c. Fat.	Darling. Evening Milk.	Darling. Evening p.c. Fat.	Hazel. Morning Milk.	Hazel. Morning p.c. Fat.	Hazel. Evening Milk.	Hazel. Evening p.c. Fat.	Ruby. Morning Milk.	Ruby. Morning p.c. Fat.	Ruby. Evening Milk.	Ruby. Evening p.c. Fat.	Theresa. Morning Milk.	Theresa. Morning p.c. Fat.	Theresa. Evening Milk.	Theresa. Evening p.c. Fat.	Total.
Average for previous 10 days.	..	6 a.m. & 4.30 p.m.	15	3·5	14	3·9	13	3·9	11	4·1	8	4·5	6	4·9	10	3·5	8	3·9	85
Period of change.	2	6 a.m. & 6 p.m.	13½	3·8	14½	3·8	13	4·4	10	4·3	6	5·8	5	5·7	9½	4·3	8	4·2	79½
	3		13½	3·9	14	3·4	12	4·6	12	4·4	5½	6·0	53	5·4	7½	3·4	6½	4·2	76½
	4		13½	3·7	14½	3·9	12½	4·8	11	4·1	5½	5·5	5½	5·8	7	4·4	6½	4·7	76
Total for period....			40½	...	43	...	37½	....	33	...	17	....	16	....	24	....	21	...	232
Milking at equal intervals.	5	6 a.m and 6 p.m.	13½	3·8	13½	3·7	11	4·4	9½	4·3	5½	6·0	5½	6·0	7½	4·8	6	4·8	72
	6		14	3·6	13½	3·4	10½	4·6	9	4·1	5	6·0	5½	6·0	7	4·8	6½	4·6	71
	7		13	3·4	14	3·7	9	4·4	9½	4·5	5	6·0	5½	6·4	6½	4·6	6½	4·1	69
	8		13	3·8	13½	3·9	11	4·5	10	4·0	5	5·5	5½	5·1	7	4·3	7	4·6	72
	9		12	3·5	13	3·7	10½	4·3	10	4·4	5	5·7	5	5·2	7½	4 7	7	5·0	70
	10		13	4·0	13	3·7	11	4·3	10	4·3	5½	6·1	5½	6·2	6½	4·8	7	4·4	71½
	11		12½	4·1	12½	3·9	11	4·4	10½	4·3	5½	6·5	5	6·6	7	5·3	6½	4·7	70½
	12		13	3·9	13	3·9	11½	4·6	10	4·7	6	6·4	5	6·5	7½	5·2	6½	4·6	72½
	13		13½	1·0	13½	3·8	11½	4·4	10½	4·6	5½	6·4	5½	6·5	8	5·1	7	5·2	75
	14		13	3·7	13½	3·9	12½	4·7	11	4 4	5½	7·1	5	6·9	8	4·7	7½	5·0	76
Total for period....			130½	....	133	....	109½	....	100	....	53½	....	53	....	72½	....	67½	....	719½
Period of change.	15	6 a.m. & 4.30 p.m.	14	4·0	12½	4·5	11	4·4	9	4·4	5½	6·8	4	6·0	8	4·8	6½	4·4	71½
	16		14½	3·7	12	4·4	11½	4·3	8½	4·7	6	5·4	4	6·3	9	4·6	6	4·9	71½
	17		15	3·9	12	4·7	12	4·4	8½	4·4	5½	5·2	4	6·2	8½	4·5	6	5·0	71½
	18		14	3·9	11½	4·6	12	4·6	8½	4·8	5½	5·5	4	6·9	7½	4·4	5	5·0	68
Total for period....			57½	....	48	...	46½	...	34½	....	22½	....	16	....	33	....	17½	...	282½
Milking at unequal intervals.	19	6 a.m. and 4. 30 p.m.	14½	3·9	11½	4·4	11½	4·1	8½	4·4	5	5·5	4½	6·1	7	4·7	5½	5·2	68
	20		14	3·5	12	4·4	11½	4·0	8½	4·8	6	5·8	4	6·3	7	5·0	5½	5·4	68½
	21		14	3·1	12	3·6	12	3·8	9	4·2	6½	5·7	4½	6·0	8½	4·6	6	4·4	72½
	22		15	3·4	12½	4·0	12½	4·0	9	4·6	6	5·5	4½	6·2	8	4·1	6	4·9	73½
	23		14½	3·6	13	4·2	11½	4·1	8½	4·6	5½	5·2	4½	5·6	8	4·5	6½	4·6	72
	24		14	3·2	12½	4·0	12½	4·0	9	4·5	6½	4·8	4½	6·4	8	4·0	6	4·2	73
	25		11½	4·0	11	4·5	12	4·4	8	4·3	6	5·8	4½	5·9	8	4·3	6	4·6	67
	26		13	3·5	12	4·4	12	4·0	8½	4·4	7	5·7	4	6·3	7½	4·4	5½	4·5	69½
	27		13½	3·8	12	4·2	11½	4·0	8½	4·8	6	5·6	4	6·0	7	4·4	5	4·7	67½
	28		12½	3·6	12	4·4	11	4·3	8½	4·9	6	5·3	4½	6·4	7½	4·6	6	4·6	68
Total for period...			136½	....	120½	....	118	....	86	....	61½	....	43½	....	76½	....	58	....	699½

SUMMARY.

DARLING—AYRSHIRE.

Average.	Average for Previous 10 Days.	1st Period of Change.	Milking Equal Intervals.	2nd Period of Change.	Milking Unequal Intervals.
Per cent fat morning	3·5	3·80	3·78	3·87	3·56
" " evening	3·9	3·61	3·75	4·55	4·21
" " whole day	3·7	3·71	3·76	4·18	3·86
Yield of butter fat	1·061 lbs.	1·037 lbs.	0·988 lbs.	1·102 lbs.	0·993 lbs.

HAZEL—GRADE.

Per cent fat morning	3·9	4·70	4·46	4·41	4·17
" " evening	4·1	4·27	4·41	4·51	4·55
" " whole day	4·0	4·49	4·43	4·46	4·36
Yield of butter fat	0·960 lbs.	1·055 lbs.	0·923 lbs.	0·903 lbs.	0·889 lbs.

RUBY—GUERNSEY.

Per cent fat morning	4·5	5·75	6·27	5·68	5·45
" " evening	4·9	5·65	6·20	6·35	6·26
" " whole day	4·7	5·70	6·24	6·01	5·85
Yield of butter fat	0·654 lbs.	0·627 lbs.	0·664 lbs.	0·578 lbs.	0·608 lbs.

THERESA—QUEBEC JERSEY GRADE.

Per cent fat morning	3·5	3·70	4·83	4·57	4·46
" " evening	3·9	4·36	4·70	4·82	4·71
" " whole day	3·7	4·03	4·76	4·69	4·58
Yield of butter fat	0·662 lbs.	0·585 lbs.	0.576 lbs.	0·672 lbs.	0·616 lbs.

A study of the above records would indicate :

1. That the percentage of butter fat in the milk, from morning or evening milking, is influenced by the comparative length of interval between the milking hours.

2. The richer milk is found to be produced after the shorter interval.

3. Where intervals between milkings are equal, no appreciable difference appears to exist in either the quality or quantity of the milk drawn in the morning or in the evening.

4. Periods of change in hours of milking are evidently periods of excitement and affect individuals differently.

STEER EXPERIMENTS.

The experiments with steers during the year have been along the line of determining the comparative economy (1), of feeding dehorned steers loose as contrasted with feeding dehorned steers tied, and feeding steers not dehorned tied ; (2) of feeding yearlings, two-year olds, or three-year olds ; (3) feeding steer calves a limited or growing ration, or feeding them a heavy or fattening ration.

The data secured in the loose versus tied experiment do not agree with results of similar work conducted elsewhere. The conditions in the case of the lot fed loose were possibly not so favourable as in the case of the lots fed tied. The temperature was on the average 10 or 12 degrees lower in the case of the lot fed loose. Nine steers were in each lot. It is possible that had there been fewer steers in the lots different results would have been observed. Ample space was allowed at the feed troughs for all, but the stronger steers made relatively greater gains than those of a quieter or more timid disposition. To test the relative economy of feeding a small or a large number together, there are being fed here at present lots of 9, 6 and 3 steers each. Exactly the same floor space is allowed per steer in each lot, namely, 62 square feet.

The rations fed the different lots were, of course, similar. The grain or meal was exactly the same per lot, whether tied or loose. The roughage, or at least the mixture of roots, ensilage, chaff and hay being limited only by the appetite of the lots. The lot fed loose ate much more of this than the lots fed tied. The exercise possible in the pen where they were fed was quite insufficient to account for this, nor would the difference in temperature mentioned above, for the greatest differences in the amounts of roughage consumed were observed when the temperatures were similar in March, April and part of May.

FEEDING STEERS.

No experiments with feeding stuffs have been conducted during the year. In November, 1899, there were put up to feed 77 steers. These cost in the stables, $2,464. The total cost to feed them was $966.85, making a gross cost of $3,430.85. They sold for $3,773,14, leaving a net profit of $342.29. The average net profit per steer was $4.44.

In estimating the cost of feeding, the following prices were charged:—

	Per ton.
Clover hay	$5 00
Straw	3 00
Ensilage	2 00
Roots, 6 cents per bushel or	2 00
Corn	16 00
Oats, pease or barley	19 00
Bran	15 00
Oil meal	35 00

The steers were fed twice a day, morning and night. A mixture of roots (as long as roots lasted), ensilage, straw and meal being given first each meal, followed by a light feed of long hay. For the first few weeks no grain or meal was fed, and later the grain ration grew gradually till about six pounds per diem was being fed. A somewhat different plan was followed in the case of the yearlings, however, which received no grain till April.

The meal ration consisted of half corn, half oats, pease, barley and bran, equal parts. About six weeks before selling, an addition of a small amount of oil meal was made to this ration, starting with one-third pound per diem, and going up to one and a half pounds.

Below are statements of the results in some of the different lots :—

STATEMENT of weights and gains of Steers in Tied vs. Loose Experiment.

Lot I.—Dehorned, Tied.—9 Steers.

First weight	pounds	8,655
Finished weight	"	10,905
Total gain in 184 days	"	2,250
Daily gain per steer	"	1·36
Gross cost of feed		$133.17
Cost of 1 pound gain	cents	5·9

Lot II.—Dehorned, Loose.—9 Steers.

First weight	pounds	8,650
Finished weight	"	10,805
Total gain in 184 days	"	2,155
Daily gain per steer	"	1·30
Gross cost of feed		$140.58
Cost of 1 pound gain	cents	6·5

Lot III.—Not Dehorned, Tied.—9 Steers.

First weight	pounds	8,635
Finished weight	"	11,074
Total gain in 181 days	"	2,439
Daily gain per steer	"	1·49
Gross cost of feed		$151.78
Cost of 1 pound gain		6·2

STATEMENT of particulars in comparative feeding of Yearlings, Two-year-olds and Three-year-olds:

Yearlings.

Number of steers in lot		9
First weight	pounds	7,275
Finished weight	"	9,193
Total gain in 192 days	"	1,918
Total gain per steer (average)	"	213·1
Daily gain per steer	"	1·11
Gross cost of feed		$95.87
Cost of 1 pound gain		0 05
Cost of steers, 7,275 pounds at $3.25 per cwt		$236 33
Total cost to produce beef, $236.33 + $95.87		332 20
Sold 9,193 pounds at $4.50 per cwt		413 68
Profit on lot		81 48
Net profit per steer		9 05

Two-year-olds.

Number of steers in lot		9
First weight	pounds	8,635
Finished weight	"	11,074
Total gain in 181 days	"	2,439
Total gain per steer (average)	"	271
Daily gain per steer	"	1·49
Gross cost of feed		$151 78
Cost of 1 pound gain	cents	6·2
Cost of steers, 8,635 pounds at $3.50 per cwt		$302 22
Total cost to produce beef, $302.22 + $151.78		454 00
Sold 11,074 pounds at $4.65 per cwt		514 94
Profit on lot		60 94
Net profit per steer		6 77

Three-year-olds.

Number of steers in lot		9
First weight	pounds	10,065
Finished weight	"	12,655
Total gain in 188 days	"	2,590
Total gain per steer (average)	"	287
Daily gain per steer	"	1·53
Gross cost of feed		$176.27
Cost of 1 pound gain	cents	6·8
Cost of steers, 10,065 pounds at $3.75 per cwt		$377 81
Total cost to produce beef, $377.81 + $176.27		554 08
Sold 12,655 pounds at $4.75 per cwt		601 11
Profit on lot		47 03
Net profit per steer		5 22

STEER CALF EXPERIMENT.

In the early part of May, 10 bull calves of at least three fourths Shorthorn blood were purchased and castrated. They were from ten days to a month old. The fact of their not having been castrated at an earlier age was somewhat against them.

On May 12 they were divided into two groups of five steers each.

Lot I was fed a limited growing ration.

Lot II was fed a full fattening ration from the start, by full fattening ration being meant, of course, one suited to growing stock.

A study of the subjoined synopses of the feeder's records will show the exact differences between the two rations.

In estimating cost of feeding calves the following values were placed on the various feeds used:—

Clover hay	25 cents per cwt.	Bran.	$0 75 per cwt.
Roots and ensilage.	10 " "	Oilmeal.	1 75 per cwt.
Corn.	80 " "	Bibby's cream.	
Oats, pease or barley.	95 " "	Equivalent.	3 50 per cwt.
		Skim milk.	15 "

Lot I—Limited Growing Ration.

1900 Week Ending.	Skim Milk.	Oats.	Corn.	Oil Meal.	Barley.	Bran.	Shorts.	Peas.	Roots.	Ensilage.	Straw.	Hay.
May, 19	525	8¾	....	....	....	....	....	....	....	35	....	17½
" 26	525	8¾	....	....	....	....	....	....	....	35	....	17½
June, 2	525	8¾	....	....	....	....	....	....	....	35	....	17½
" 9	525	8¾	....	....	....	....	....	....	....	35	....	17½
" 16	525	8¾	....	....	....	....	17½	....	....	....	....	35
" 23	525	8¾	....	....	....	....	17½	....	....	....	....	35
" 30	525	17½	....	....	....	8¾	17½	....	....	....	....	35
July, 7	350	17½	....	....	....	8¾	17½	....	....	....	....	35
Total for 8 weeks	4025	87½	....	....	....	17½	70·0	....	....	140·0	....	210·0
July, 14	350	17½	....	....	....	8¾	17½	....	....	....	....	35
" 21	350	17½	....	....	....	8¾	17½	....	....	....	....	35
" 28	350	17½	....	....	....	17½	17½	....	....	....	....	35
Augt. 4	350	24½	....	....	....	17½	17½	....	....	....	....	70
" 11	350	24½	....	....	....	17½	17½	....	....	....	....	70
" 18	350	24½	....	....	....	24½	24½	....	....	....	....	70
" 25	350	24½	....	....	....	24½	24½	....	....	....	....	70
Sept. 1	350	24½	....	....	....	24½	24½	....	....	....	....	70
Total for 8 weeks	2800	175·0	....	....	....	143½	161·0	....	....	....	....	455·0
Sept. 8	350	24½	....	....	....	24½	24½	....	....	....	....	70
" 15	350	26¼	....	....	....	26¼	26¼	....	....	....	....	70
" 22	....	26¼	....	....	....	26¼	26¼	....	....	....	....	70
" 29	....	35	....	....	....	35	26¼	....	....	....	....	70
Oct. 6	....	35	....	....	....	35	26¼	....	....	....	....	70
" 13	....	35	....	....	....	35	35	....	....	....	....	70
" 20	....	35	....	....	....	35	35	....	....	....	....	70
" 27	....	35	....	....	....	17½	17½	....	....	....	....	70
Total for 8 weeks	700	252	....	....	....	234½	217	....	....	....	....	560
Nov. 3	....	35	....	....	....	35	....	....	....	70	....	Pasture
" 10	....	35	....	....	....	36	....	....	....	70	....	Pasture
" 17	....	35	....	....	....	17½	17½	....	....	70	....	35
" 24	....	35	....	....	17½	35	17½	....	70	3[illegible]	....	35
Dec. 1	....	35	....	....	17½	35	17½	....	70	35	....	35
Total for 4 weeks	....	175	....	....	35	157½	52½	....	140	280	....	105

Lot II—Full Fattening Ration.

1900. Week Ending.	Skim milk.	Oats.	Corn.	Oil meal.	Barley.	Bran.	Shorts.	Peas.	Roots.	Ensilage.	Straw.	Hay.
May, 19	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	...	...	...	...	...	35	...	$17\frac{1}{2}$
" 26	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	...	...	...	...	...	35	...	$17\frac{1}{2}$
June, 2	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	...	...	...	...	...	35	...	$17\frac{1}{2}$
" 9	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	...	...	...	...	...	35	...	$17\frac{1}{2}$
" 16	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	...	...	...	...	...	...	...	35
" 23	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	...	$4\frac{6}{16}$	...	...	...	...	...	35
" 30	525	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	...	$4\frac{6}{16}$	...	...	...	...	...	35
July, 7	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	...	$4\frac{6}{16}$	...	...	...	...	...	35
Total for 8 weeks	4,025	$87\frac{1}{2}$	$21\frac{14}{16}$	$21\frac{14}{16}$	...	$13\frac{2}{16}$	...	...	...	140	...	210
July, 14	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	...	$4\frac{6}{16}$	...	...	...	...	...	35
" 21	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	...	$4\frac{6}{16}$	...	...	...	...	...	35
" 28	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{9}{16}$	...	$17\frac{1}{2}$	...	...	...	...	...	35
Aug. 4	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$6\frac{9}{16}$		$17\frac{1}{2}$	...	...	...	...	...	70
" 11	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$6\frac{9}{16}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 18	350	$24\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 25	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$10\frac{1}{2}$	...	$24\frac{1}{2}$	...	...	...	...	...	70
Sept. 1	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$10\frac{1}{2}$	...	$24\frac{1}{2}$	...	...	...	...	...	70
Total for 8 weeks	2,800	175	$49\frac{14}{16}$	$57\frac{3}{4}$	...	$127\frac{3}{4}$	...	...	...	...	...	455
Sept. 8	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$10\frac{1}{2}$	...	$24\frac{1}{2}$	...	...	...	...	...	70
" 15	350	$17\frac{1}{2}$	$8\frac{3}{4}$	$10\frac{1}{2}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 22	...	$26\frac{1}{4}$	$8\frac{3}{4}$	$12\frac{1}{4}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 29	...	$26\frac{1}{4}$	$8\frac{3}{4}$	$12\frac{1}{4}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
Oct. 6	...	35	$12\frac{1}{4}$	$12\frac{1}{4}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 13	...	35	$12\frac{1}{4}$	$12\frac{1}{4}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 20	...	35	$26\frac{1}{4}$	$12\frac{1}{4}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
" 27	...	35	$26\frac{1}{4}$	$19\frac{1}{4}$	...	$17\frac{1}{2}$	...	...	...	...	...	70
Total for 8 weeks	700	$234\frac{1}{2}$	$109\frac{13}{16}$	$101\frac{1}{2}$	...	147	...	...	...	...	...	560
Nov. 3	...	35	35	...	...	$17\frac{1}{2}$	...	...	...	70	...	Pasture
" 10	...	35	35	...	...	$17\frac{1}{2}$	...	...	...	70	...	Pasture
" 17	...	35	35	...	...	$17\frac{1}{2}$	...	...	70	35	...	35
" 24	...	35	35	...	...	35	...	...	70	35	...	35
Dec. 1	...	35	35	...	...	35	...	...	105	35	...	35
Total for 4 weeks	...	175	175	...	...	$122\frac{1}{2}$	...	...	245	245	...	105

The following tables contain a synopsis of results observed to December 1, 1900.

LOT I. LIMITED GROWING RATION—FIVE STEERS.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 Lb. Gain.	Cost to Feed 1 Steer 1 Day.	Remarks.
	Lbs.	Lbs.	\$ cts.	cts.	cts.	
First period 8 weeks	299	1·30	8 25	2·75	2·94	Lot weighed 595 lbs. May 14, or an average of 119 lbs.
Second "	344	1·11	9 42	2·73	3·36	
Third "	328	1·06	8 43	2·57	3·01	
Fourth 4 weeks	319	2·12	4 29	1·34	3·08	
Aggregate or average	1,290	1·31	30 39	2·35	3·10	Total weight 1,885 lbs. December 1.

LOT II. FULL FATTENING RATION—FIVE STEERS.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 Lb. Gain.	Cost to Feed 1 Steer 1 Day.	Remarks.
	Lbs.	Lbs.	$ cts.	cts.	cts.	
First period 8 weeks....	310	1·35	8 18	2·63	2·90	Lot weighed 751 lbs. May 14, or an average of 150 lbs.
Second "	373	1·20	9 37	2·51	3·34	
Third " ...	418	1·37	8 44	2·01	3·01	
Fourth period 4 weeks...	313	2·08	6 85	2·19	4·89	
Aggregate or average....	1,414	1·44	32 84	2·32	3·35	Total weight 2,165 lbs. December 1.

PIGS.

At present the stock of breeding pigs consists of the following pure bred animals :

Improved Large Yorkshires	1 boar	9 months.
	2 sows	1 year.
	3 sows	9 months.
Improved Berkshires	1 boar	2½ years.
	2 sows	9 months.
Tamworths	1 boar	2 years.
	1 sow	15 months.
	1 sow	6 months.

There are besides a number of young Yorkshires and Tamworths about three months old.

The 'soft' pork investigations are being continued, a full report of which will be published at a later date.

Economy of Pork Production.

A number of pigs have been fed upon artichokes (see page 94) on rape, (see page 92) on pumpkins, raw and cooked; (see page 93) on clover pasture, on steamed clover, on mangels, on grain alone, on grain and milk, on grain alone, fed three times a day, and on similar grain fed from a self-feeder.

The following statements will indicate the comparative economy of the various rations or methods of feeding :—

Statement A.

Lot of 5 pigs on clover pasture and grain—

To 5 pigs, average weight 90 pounds, at $5.50 each	$ 27 50
½ acre clover pasture (see page for value)	4 50
1,600 pounds meal at 90 cents	14 40
Total	$ 46 40
By 900 pounds pork at $6 per cwt	$ 54 00
Profit on lot	7 60
Profit per pig	1 52
Cost to produce 100 pounds pork	4 20

Statement B.

Lot of 6 pigs on steamed clover and grain—

To 6 pigs, average weight 73 pounds, at $4.50 each	$ 27 00
¾ tons clover at $5	3 75
1,475 pounds meal at 90 cents	13 27
Total	$ 44 02
By 1,085 pounds pork at $6 per cwt	$ 65 10
Profit on lot	21 08
Profit per pig	3 51
Cost to produce 100 pounds pork	2 63

Statement C.

Lot of 6 pigs on mangels and grain—

To 6 pigs, average weight 73 pounds, at $4.50 each	$ 27 00
6,200 pounds mangels at $2 per ton	6 20
1,350 pounds grain at 90 cents per cwt	12 15
Total cost	$ 45 35
By 1,112 pounds pork at $6 per cwt	$ 66 72
Profit on lot	21 37
Profit per pig	3 56
Cost to produce 100 pounds pork	2 87

Statement D.

Lot of 6 pigs fed on grain alone—

To 6 pigs, average weight 73 pounds, at $4.50 each	$ 27 00
2,123 pounds grain at 90 cents per cwt	19 11
Total cost	$ 46 11
By 1,068 pounds pork at $6 per cwt	$ 64 08
Profit on lot	17 97
Profit per pig	2 99
Cost to produce 100 pounds pork	3 03

Statement E.

Lot of 6 pigs fed on grain and milk—

To 6 pigs, average weight 43 pounds, at $3 each	$ 18 00
1,340 pounds skim milk at 15 cents per cwt	2 01
2,003 pounds meal at 90 cents per cwt	18 03
Total cost	$ 38 04
By 1,152 pounds pork at $6 per cwt	$ 71 12
Profit on lot	33 08
Profit per pig	5 51
Cost to produce 100 pounds pork	2 24

Statement F.

Lot of 5 pigs fed grain only three times a day—

To 5 pigs, average 120 pounds, at $7.50 each	$ 37 50
1,289 pounds meal at 90 cents per cwt	11 60
Total cost	$ 49 10
By 953 pounds pork at $6 per cwt	$ 55 18
Profit on lot	6 08
Profit per pig	1 21
Cost to produce 100 pounds pork	3 28

Statement G.

Lot of 5 pigs on self-feeder—

To 5 pigs, average weight 98 pounds, at $6.00 each	$ 30 00
1,907 pounds grain at 90 cents	17 16
Total cost	$ 47 16
By 958 pounds pork at $6 per cwt	$ 57 48
Profit on lot	10 32
Profit per pig	2 06
Cost to produce 100 pounds pork	3 57

In the foregoing statements a uniform selling price has been used to permit of comparison of profits. The actual selling prices were as follows :—A, $6 per cwt.; B, $5.25 per cwt.; C, $5.25 per cwt.; D, $5.25 per cwt.; E, $6.25 per cwt.; F, $6 per cwt.; G, $6 per cwt.

The differences in prices are due to the then state of the market, and so should not be considered in making a comparison of profits.

The meal fed in every case consisted of one-half corn, one-half oats, pease and barley, equal parts. This was worth on the markets sometimes 95 cents per cwt., at other times 85 cents per cwt., so an average price of 90 cents per cwt. has been charged.

The question of age enters into the relative profits as well as into the relative costs of producing 100 pounds gain. The pigs in A, F and G were considerably older than in the other lots, and so the greater cost of gain must in some measure be attributed to this fact.

SHEEP.

The flocks on the Central Experimental Farm are kept to use to the best advantage a bit of stony land and to carry on some experimental work in breeding and feeding.

THE FLOCKS.

The flocks consist of: Leicesters, 1 ram and 7 ewes; Shropshires, 1 ram and 8 ewes; grades, 6 bred to Leicester ram and 3 bred to Shropshire ram.

A very good lamb crop came in the spring, an average of 1⅗ lambs to breeding ewe. The lambs did not do as well at first as was anticipated, the trouble being the small white intestinal worm. Since ridding them of this dangerous pest, however, they have done exceedingly well.

CARE AND MANAGEMENT OF BREEDING EWES.

All too frequently the care and proper management of his flock of breeding ewes receives scant attention from the farmer. He thinks them able to shift for themselves, and, as a result, declares sheep 'no good.' A little care and a very small expenditure of money would frequently change this verdict and leave a nice balance in favour of the smallest as well as the larger flocks.

Accordingly, a few suggestions as to the care of breeding ewes are offered.

In the Autumn.

In the autumn, just prior to the mating season, the ewe should be given fresh pasture or a small feed of grain to start her gaining in flesh. This should be kept up through the mating season and may be expected to show up in results at lambing time with an increased percentage of lambs.

As the housing time draws near, see that the fold is in good condition, that is, clean and free from holes likely to cause draughts. A cool, well-ventilated, clean pen means good, healthy sheep and sturdy lambs. While shelter and cleanliness, with pure, cool air, are essential, exercise is imperative, if a good lamb crop is to be hoped for. Of course, mild exercise is understood.

The winter ration should consist largely of roots (turnips) and clover hay or pea straw. Ensilage has been fed with great success. As lambing time draws on, less roots should be fed. The milking ewe needs a considerable addition to the roughage ration and mangels, with clover or pea straw and some shorts or bran and crushed oats, suit her well.

An excellent supplementary food in summer is afforded by rape. This is especially good for lambs. They may be allowed to nibble it at will, having other pasture to run on at the same time.

.FARM CROPS.

The rotation mentioned in the report for 1899 is being followed. The following crops have been grown during this year:—

OATS.

Five varieties of oats were grown, namely, Banner, Improved, Ligowo, Golden Beauty, American Beauty and Siberian. They were sown on land that had been in roots, corn or potatoes the preceding year. In the autumn after the above-mentioned crops had been harvested, the land was ribbed, as is done in sowing turnips or mangels, and left lying so till the spring, when it was broken down and sown. The particulars of the varieties grown are as follows :—

Golden Beauty.—4¼ acres, sown May 2, 1¾ bushels per acre, matured in 103 days, August 13. Yielded 48 bushels per acre. Measured bushel weighed 40½ pounds.

Siberian.—6½ acres, sown May 3. 1¾ bushels per acre, matured in 105 days, August 16. Yielded 54¼ bushels per acre. Measured bushel weighed 42 pounds.

American Beauty.—4½ acres, sown May 2, matured in 103 days, August 13. Yielded 47½ bushels per acre. Measured bushel weighed 40 pounds.

Improved Ligowo.—8¾ acres, sown April 28, 1¾ bushels per acre, matured in 98 days, August 4. Yielded 50⅞ bushels per acre. Measured bushel weighed 42½ pounds.

Banner.—12 acres, sown April 30, 2 bushels per acre, matured in 100 days, August 8. Yielded 60⅓ bushels per acre. Measured bushel weighed 40 pounds.

Below is a statement of cost of growing this lot of oats, with an estimate of the cost of providing digestible dry matter through this crop:—

Cost of growing 12 acres oats—

Rent of land, at $3 per acre	$36 00
Ribbing in autumn, 3 days at $2.50	7 50
Cultivating in spring twice, 3½ days at $2.50	8 75
½ manure, at rate of 15 tons per acre, $1 per ton, applied in root year	36 00
Harrowing in spring, at 20c	2 40
Seed, 24 bushels at 50 cts	13 00
Sowing, 1 2-10 days at $2.50	3 00
Rolling, 7-10 days at $2.50	1 75
Cutting with binder, 1 4-10 days at $2.50	3 50
Twine, $4.80 : use of binder, $5	9 80
Shocking and cutting with scythes, 4 men, 1½ days at $1.25	7 50
Loading and unloading, 6 men, 1 day	7 50
Drawing in, 2 teams, 1 day at $2.50	5 00
Threshing, at 2½ cents per bushel, 724 bushels	18 10
Yield, 20 tons straw and 24,616 pounds, or 724 bushels, grain.	$159 80

Cost to produce 1 ton grain	$9 21
Cost to produce 1 bushel grain	15⅝ cts.
Cost to produce 1 ton straw	$2 32
Cost to produce 100 pounds digestible dry matter, grain	73 cts.
Cost to produce 100 pounds digestible dry matter, straw	27 cts.

BARLEY.

Mensury.—5 acres were sown on what had been corn and sorghum land the preceding year. Sown May 2, matured in 92 days, August 2. Yielding 40 bushels, 38 pounds per acre. Measured bushel weighed 52 pounds.

Cost of growing 5 acres barley—

Rent of land, at $3 per acre	$15 00
Ribbing in autumn, 1¼ days at $2.50	3 16
Cultivating in spring twice, 1¼ days at $2.50	3 16
½ manure, at rate of 15 tons per acre, at $1 per ton	15 00
Seed, 9¾ bushels, at 50 cents per bushel	4 87½
Sowing, ½ day at $2.50	1 25
Rolling, 2½ hours, at 25 cents	0 63
Cutting with binder, ½ day	1 25
Twine, $2 ; use of binder, $2	4 00
Shocking, 2 men, ½ day	1 25
Hauling, 1 team and 4 men, 1 day	8 50
Threshing, 204 bushels, at 3½ cents per bushel	7 14
Yield, 90 tons straw, and 9,790 pounds, or 204 bushels, grain.	$65 22

Cost to produce 1 ton grain	$10 07
Cost to produce 1 bushel grain	24·1 cts.
Cost to produce 1 ton straw	$1 83
Cost to produce 100 pounds digestible dry matter, grain	65·8 cts.
Cost to produce 100 pounds digestible dry matter, straw	20 cts.

PEASE.

Prussian Blue.—8 acres. This crop was grown on land that had been pastured for two years. It had been broken up early the preceding autumn. The seeding was done May 11, and the crop matured in 108 days, August 27. The growth of straw was heavy, but grain light, yielding 18¼ bushels per acre. Measured bushel weighed 63 lbs.

Cost of Growing 8 Acres of Pease.

Rent of land at $3 per acre	$24 00
½ manure, 15 tons to acre at $1	24 00
Ploughing in autumn at $2 per acre	16 00
Harrowing and cultivating in spring	7 50
Seed, 16 bushels at 80c	12 80
Cutting 1 day, team and 2 men	5 00
Drawing in, 2 teams and 4 men, 1 day	11 00
Threshing at 2½ cents per bushel, 147 bushels	3 68
Total	$103 98

Yield : 147 bushels grain or 8,820 pounds, and 20 tons straw.

Cost to produce 1 ton grain	$15 70
Cost to produce 1 bushel grain	47·1
Cost to produce 1 ton straw	1 73
Cost to produce 100 lbs. digestible dry matter, grain	90·2
Cost to produce 100 lbs. digestible dry matter, straw	21

MIXED CROP EXPERIMENT.

Side by side on the first year of the rotation field, that is on what had been pasture the preceding year, were sown 8 plots of 2 acres each, the aim being to get some data as to the comparative yields of crops grown as mixtures and as pure grains.

	Pounds of grain.
Plot 1, pure pease, yielded	2,202
Plot 2, pure barley, yielded	2,504
Plot 3, pure oats, yielded	4,119
Plot 4, mixture, barley 1 bushel, oats 1 bushel, pease 1 bushel, yielded	3,117
Plot 5, mixture, pease 1 bushel, oats 2 bushels, yielded	2,493
Plot 6, mixture, oats 1½ bushels, barley 1 bushel, yielded	2,915
Plot 7, mixture, wheat ½ bushel, barley ¾ bushel, oats 1 bushel, pease ¾ bushel, yielded	3,120
Plot 8, mixture, oats and pease equal parts by weight, yielded	1,341

It would be difficult to put a value on the straw from the various plots. Plot 8 gave a very heavy yield, of coarse long straw. The soil was in this case of a mucky nature.

MILLET.

A plot, 1 acre in area, was sown to domestic millet. The soil, a sandy loam, was rather wet, due to imperfect drainage. It had been in pasture the preceding year. The millet was sown broadcast, and made a fair growth. Sown June 15, it was harvested for hay August 24, and yielded 1 ton 920 pounds of dry fodder. After harvesting it made a fair growth on the stubble, but not sufficient to warrant cutting again.

MIXED HAY.

The hay crop was only fair this year, the total amount harvested being 140 tons. Below is a statement of the cost of growing 32 acres mixed hay :—

Rent of land at $3 per acre....	$96 00
⅕ manure at 15 tons per acre, $1 per ton....	96 00
½ seed at $1.50 per acre, 10 lbs. clover, 12 lbs. timothy....	24 00
4 days' cutting at $2.50....	10 00
2 days' teddering at $1.75....	3 50
3 days' raking at $1.75....	5 25
Rent of machines, oil, etc....	4 00
Cocking 6 days at $1.25....	7 50
Hauling in, 4 teams and 8 men, 1 day....	20 00
	$266 25

Yield : 60 tons.

Cost to produce 1 ton hay....	$ 4 45
Cost to produce 100 lbs. digestible dry matter....	43·6

Clover Hay.

Cost to grow 7 acres clover :—

Rent of land at $3....	$21 00
⅕ manure, 15 tons to acre, $1 per ton....	21 00
½ seed, at $1.50 per acre, 10 lbs. clover, 12 lbs. timothy....	5 25
1¼ days' cutting at $2.50....	3 12
½ day teddering at $1.75....	87
¾ day raking at $1.75....	1 31
Rent of machines, etc....	1 00
Cocking, 2 days at $1.25....	2 50
Hauling, 3 teams and 4 men, ½day....	6 25
	$62 30

Yield : 20 tons.

Cost to produce 1 ton....	$3 12
Cost to produce 100 lbs. digestible dry matter....	30·6

SORGHUM OR SUGAR CANE.

Sugar cane, Early Amber, 1 acre. The soil was sandy, of fair quality and received a dressing of barn-yard manure in the spring of 1895 of about 15 tons per acre. No fertilizer had been applied subsequently. The previous year it had been in pasture. The land was ploughed early in the autumn of 1899 about 4 inches deep, harrowed several times to keep down all growth, and cultivated the following spring and harrowed with the smoothing harrows before sowing. Sown June 16, with a force-feed seed-drill, in rows 3 feet apart; came up June 28.

The growth was very slow during July, owing to the large amount of rain. In August the crop made great progress, and stood about 10 feet high early in September. It was then cut and fed to dairy cattle and steers.

It is very seldom a good crop of sorghum is harvested in this section, owing to the great rainfall. A fairly dry June and July are essential to success with this grass.

CORN (*ZEA MAYS*).

Ten varieties were sown in areas ranging from ½ to 8½ acres, the aggregate being 30 acres.

Corn constituting part of the second year of the rotation, the soil was gang-ploughed the preceding autumn, a fair growth of clover being turned down, save where pease had been grown. Manure, at the rate of about 15 tons to the acre, was hauled out in the winter, left in small heaps and scattered as the frost was leaving the ground. The whole area was cultivated as frequently as weather would permit, until time to seed.

The sowing was done with a force drill in rows 42 inches apart.

The following particulars about the different varieties may be of interest:—

King of the Earliest.—2 acres soil, loam. Sown June 6. Cut for ensilage September 24, late dough stage. Yield, 13 tons 1,626 pounds per acre.

Giant Prolific Sweet Ensilage.—2 acres. Sown June 5. Cut for ensilage Septmeber 24. Very few ears. Yield, 16 tons 367 pounds per acre.

Selected Leaming.—4 acres. Sown June 1. Cut for ensilage September 22, late dough stage. Yield, 14 tons 1,325 pounds per acre.

Canada White Flint.—2 acres. Sown June 6. Cut for ensilage September 24, ripening. Yield, 11 tons 585 pounds per acre.

Early Mastodon.—2 acres. Sown June 6. Cut for ensilage September 24, dough stage. Yield, 14 tons 140 pounds per acre. This lot was on low land and was frozen to some extent.

Longfellow.—3 acres. Sown May 30. Cut for ensilage September 22, late dough stage. Yield, 17 tons 851 pounds per acre.

Mammoth Cuban.—3 acres. Sown May 30. Cut for ensilage September 23, dough stage. Yield, 13 tons 1,260 pounds per acre.

Clouds Early.—½ acre. Sown May 30. Cut for ensilage September 22, dough stage. Well eared. Yield, 9 tons 1,412 pounds per acre.

Whitecap Yellow Dent.—3 acres. Sown June 5. Cut for ensilage September 22, well-eared, dough stage. Yield, 10 tons 1,050 pounds per acre.

Selected Leaming.—8½ acres. Sown May 30 and cut September 14, very well-eared, late dough stage. The land on which this variety was grown was better drained than the area occupied by the other varieties, and so we may infer that the crop harvested off this area is representative.

The yield was 20 tons 235 pounds per acre, or 171 tons off the field.

Below is a summary of the cost of producing the finished ensilage from this area.

CORN (*ZEA MAYS*).

Selected Leaming.

Cost of growing 8½ acres of corn:—

Rent of land at $3 per acre	$25 50
Cultivating in autumn 5 days at $2.50	12 50
½ value of manure applied 15 tons at $1	25 50
Ploughing in spring at $2 per acre	17 50

Harrowing twice at 20 cents per acre	$ 3 40
Seed 225 pounds at $1 per hundred	2 25
Sowing, team 1 day $2.50	2 50
Harrowing after sowing (twice) at 20 cents per acre	3 40
Hoeing 17 days at $1.25	21 25
Cultivating with team 6½ days at $2.50	13 75
Cutting with machine 2½ days at $2.50	7 50
Loading and unloading, tramping, cutting 37 days	46 25
Drawing in team 9 days at $2.50	22 50
Man at engine 3 days at $1.50	4 50
Use of engines and fuel and Ensilage cutter 3 days at $5	15 00
Total cost	$213 30

Yielded, 171 tons corn in silo.

Cost $1.25 per ton in silo, or 3·75 cts. per bushel.

Average amount of dry matter per ton 375 lbs., (75 per cent digestible). Cost of producing 100 lbs. digestible dry matter, 44⅗ cts.

MANGELS.

Three varieties of mangels were sown. Sown May 13, harvested October 20.

Gate Post Red.—Two acres, yielded 31 tons 1,295 pounds, or 1,054 bushels 55 pounds per acre.

Giant Yellow Globe.—One acre, yielded 31 tons 1,960 pounds, or 1,066 bushels per acre.

Golden Tankard.—Twelve acres, yielded 30 tons 36 pounds, or 1,000 bushels and 36 pounds per acre.

The dry matter content of the varieties differ materially.

Variety.	Digestible dry matter in 100 lbs.	From 1 acre. lbs.
Gate Post Red	11·14	7,051·62
Giant Yellow Globe	8·19	5,238·87
Golden Tankard	10·25	6,153·43

These varieties were grown on land of a fairly uniform character, therefore difference in composition cannot be attributed to varieties in soil.

Below is cost of growing the above :

MANGELS.

Cost of growing 4½ acres mangels—

Rent of land at $3	$13 50
Cultivating in autumn 4 times	7 50
½ cost of manuring 15 tons per acre at $1 per ton	13 50
Ploughing in spring at $2	9 00
Harrowing twice 7 hours at 25 cents	1 75
Drilling 2 days at $2.50	5 00
Rolling 3 hours	0 75
Seed 13½ pounds at 20 cents	2 70
Sowing 2 days at $1.25	2 50

Hand wheel hoeing 5½ days at $1.25	$ 6 88
Thinning 9 days at $1.25	11 25
Hoeing, 10 days at $1.25	12 50
Cultivating, single horse, 6 days $1.75	10 50
Pulling and topping 11 days	13 75
Drawing team 6 days $2.50	15 00
Loading and unloading 9 days $1.25	11 25
Total yield 143 tons.	$137 33

Cost of 1 ton mangels housed 96 cts., or 2·88 cts. per bushel.
Average dry matter per ton, 200 lbs. Cost of 100 lbs. digestible dry matter 48 cts.

TURNIPS.

Three varieties were grown with fair success. The soil was inferior to that under mangels inasmuch as it was not well drained. The plants made a uniform growth, but owing to the weather made a relatively greater top than root growth and so did not yield so well as might have been anticipated from looking at them growing.

Two acres sown later and on land better suited for this crop gave a greater yield by about fifty per cent.

Manure was applied during the spring and thoroughly incorporated with the soil. After being well cultivated the soil was drilled into ridges 2 feet apart. These were compacted by means of the land roller and seed-sown at the rate of 3 pounds per acre. The varieties with particulars concerning each are as follows :—

Skirving's Purple Top.—One acre, sown June 16, harvested November 2, roots small, yield, 17 tons 1,590 pounds per acre.

Champion Purple Top.—One acre, sown June 16, harvested November 2, roots rather small, yield, 18 tons 1,039 pounds per acre.

Rennie's Prize Purple Top.—Two acres, sown June 16, harvested November 2, roots small, yield, 17 tons 827 pounds per acre.

Analyses of samples of each variety grown this year, taken when the roots were being harvested show them to be practically equal in dry matter. The average percent of digestible dry matter being 10·49.

The following itemized statement of cost of production may be of interest.

TURNIPS (SWEDES.)

Rent of land at $3	12 00
Cultivating in autumn three times	7 50
½ manure, 15 tons per acre, valued at $1 per ton	12 00
Ploughing in spring at $2	8 00
Harrowing twice	1 62
Drilling 1 7-10 days at $2.50	4 25
Rolling 2½ hours	63
Seed, 12 pounds at 20 cents	2 40
Sowing, 16 hours at 12½ cents	2 00
Hand-wheel hoeing, 3 3-10 days	4 13
Thinning, 8 days at $1.25	10 00
Hoeing once, 6 days	7 50
Cultivating, single horse, 5 days at $1.75	8 75
Pulling and topping, 10 days at $1.25	12 50
Drawing, team 4 days at $2.50	10 00
Loading and unloading, 9 days	11 25
	$114 52

Total crop, 71 tons. One ton cost in root-house $1.63, or 4·89 cents per bushel. Cost of producing 100 pounds digestible dry matter, 77 cents.

CARROTS.

Three varieties of carrots were grown in half-acre lots side by side. The land was cultivated the previous autumn, ploughed in the spring and manured at the rate of 15 tons per acre. Particulars of the varieties are as follows:—

Mammoth White Intermediate.—½ acre. Sown May 16, harvested October 25. Yielded 27 tons 1,930 pounds or 932⅙ bushels per acre.

Improved Short White.—½ acre. Sown May 16, harvested October 25. Yielded 27 tons 1,160 pounds or 919⅓ bushels per acre.

Guerande or Ox Heart (Red).—½ acre. Sown May 16, harvested October 25. Yielded 24 tons 1,520 pounds or 825⅓ bushels per acre.

The white varieties gave the larger returns. The red contain more dry matter or food per ton, but do not keep so well. The white varieties give about 169·2 pounds digestible dry matter to the ton, while the red give about 233·0 pounds to the same quantity of roots.

Below is a statement of the cost of producing carrots.

Cost of Growing One and One-half Acres of Carrots.

Rent of land, 1½ acres, at $3	$4 50
Cultivating in autumn 4 times	2 25
Ploughing in spring at $2	3 00
½ manure, at 15 tons per acre, $1 per ton	4 50
Harrowing twice, 2½ hours at 25 cents	62½
Drilling, 5 hours at 25 cents	1 25
Rolling, 1 hour	25
Seed, 4½ pounds at 45 cents	2 02
Sowing, 5 hours at $1.25 per diem	63
Hand-wheel hoeing twice, at $1.25	2 50
Thinning, 5½ days at $1.25	6 88
Hoeing once, 2 days at $1.25	2 50
Cultivating single horse 4 times, 16 hours at 17½ cents	2 80
Ploughing team, 5 hours at $2.50	1 25
Pulling, topping and loading, 12 days at $1.25	15 00
Drawing in and unloading, 2 days at $2.50	5 00
	$54 95

Yield, 40 tons carrots. Cost, $1.37 per ton housed, or 4·11 cents per bushel.

Average dry matter per ton, 200 pounds. Cost of 100 pounds digestible dry matter, 68 cents.

SUGAR BEETS.

Two plots of sugar beets were grown. Vilmorin's White Improved was the variety selected.

To gain some information as to the comparative economy of growing sugar beets or mangels for feed, and to ascertain the relative cost of growing a given area (1) as for forage, (2) as for sugar, two plots of one-quarter acre each were grown side by side. The ground was prepared as for other root crops, and the same amount of barn-yard manure was applied. In thinning for forage, plants were left 8 inches apart, but for sugar, 4 inches apart. The hoeing, cultivating, &c., of the two plots was the same for some time, but when a fair growth had been made, that is, when the plants were about two months old, those intended for forage were treated as mangels, that is, the upper part of the root left exposed, while those intended for sugar were hilled up, the whole root and crown thereof being covered.

Th yield per acre was nearly the same from the two plots, being at the rate of 21 tons 640 pounds from the forage and 20 tons 1,060 pounds from the sugar plot.

The digestible dry matter content of the roots from the two plots differed materially, namely, 22·50 pounds of dry matter in 100 pounds of roots in the case of roots intended for sugar, and 18·74 pounds of dry matter in 100 pounds of roots intended for forage.

Below is the cost of producing sugar beets (*a*) for sugar (*b*) for forage :—

(*a*).—BEETS (FOR SUGAR.)

Cost of growing one-quarter acre sugar beets for sugar—

Rent of land, at $3	$0 75
Cultivating in autumn	0 37½
½ manure, at 15 tons per acre, valued at $1 per ton	0 75
Ploughing in spring	0 50
Harrowing	0 10
Drilling	0 33
Rolling	0 05
Seed, 3 pounds at 20 cents	0 60
Sowing, 1 hour	0 12½
Hand-wheel hoeing, 2½ hours	0 33
Thinning, 11 hours	1 38
Hoeing, 7 hours	0 87½
Cultivating, single horse	1 05
Ploughing out roots, 1 hour at 25 cents	0 25
Pulling and topping, 12 hours at 12½ cents	1 50
Drawing in roots, 3 hours	0 75
Loading and unloading, 10 hours	1 25
	$10.96½

Yield on one-quarter acre, 10,265 pounds.

Cost of producing 1 ton	$2 14
Cost of producing 1 bushel	6·42 cts.

Digestible dry matter in 1 ton, 450 pounds.

Cost of 100 pounds of digestible dry matter	48 cts.

(*b*.)—BEETS (FOR FEED.)

Cost of growing one-quarter acre sugar beets for feed—

Rent of land, at $3	$0 75
Cultivating in autumn	0 37½
½ manure, at 15 tons per acre, valued at $1 per ton	0 75
Ploughing in spring	0 50
Harrowing	0 10
Drilling	0 33

Rolling	$0 05
Seed, 3 pounds at 20 cents	0 60
Sowing, 1 hour	0 12½
Hand-wheel hoeing, 2½ hours	0 33
Thinning, 9 hours	1 13
Hoeing, 6 hours	0 75
Cultivating, single horse, 6 hours at 17½ cents	1 05
Ploughing out roots, 1 hour	0 25
Pulling and topping, 10 hours	1 25
Drawing in roots, 2½ hours	0 63
Loading and unloading, 8 hours	1 00
	$9 97

Yield on one-quarter acre, 10,660 pounds.

Cost of producing 1 ton	$1 87
Cost of producing 1 bushel	5·61 cts.

Digestible dry matter in 1 ton, 375 pounds.

Cost of 100 pounds of digestible dry matter	50 cts.

RAPE (*Brassica Napus*).

As the question of cheap pork production assumes greater proportions in view of our rapidly growing bacon trade, forage plants peculiarly suited for pigs must certainly come to the front. It is well known that the pig thrives on grass or green feed alone, but the importance and necessity of feeding him on such is very often overlooked. Another consideration frequently neglected is the comparative value of different forage plants for the end in view. The conditions governing the feeding operations, however, enter into this matter, and frequently such crops as can be most conveniently produced or utilized must take precedence over others better adapted to the end in view.

Of the various crops more or less extensively cultivated for pig feed during the past two years, none other has given quite such satisfactory results as rape. The variety best suited for forage is Dwarf Essex.

During the past year about 4½ acres have been under rape. The plots have been cultivated as follows:—

Plot 1.—This plot, 1½ acres in extent, was a slightly loamy sand. It was manured 15 tons to the acre in May, and the rape sown in drills 30 inches apart on May 19. This crop grew very rapidly and yielded in August 28 tons green fodder to the acre. A second crop grew up and gave about 3 tons to the acre.

Plot 2.—This plot, 1¼ acres in area, was a good loam. It was manured 12 tons to the acre in June and sown in drills 30 inches apart, June 16. In August it cut 22 tons to the acre, and the land was then ploughed.

Plot 3.—This plot, ¼ acre in area, was sown broadcast on June 18.

The plot had been used as a pig pasture the preceding summer, so no manure was necessary. This plot was used as a pasture for store pigs.

Plot 4.—This plot, three-sixteenths of an acre in area, was sown in drills 30 inches apart. It was used as pasture for pigs.

Plot 5.—This plot, 1½ acres in area, was sown on sod, ploughed July 16. No manure was added, but the best seed bed possible under the circumstances was prepared, and the plot sown July 23 partly in drills 18 inches apart and partly broadcast. The land being rather dirty and in a poor state of tilth, this plot did not do very well. The part sown broadcast was a very light crop indeed. The part sown in drills did very much better, however, as it was possible to cultivate by means of the hand-wheel hoe.

Plots 1 and 2 were cut and used as soiling crops for steers, calves, pigs and sheep. It was impossible to get any idea of the exact feeding value from the animals fed. The steers, ten in number, averaged 1,000 pounds weight and made gains at the rate of 2 pounds per diem each while on the rape, no grain being fed.

A lot of ten steer calves were given a good feed daily and appeared to enjoy the juicy leaves and stems very much, and to thrive thereon.

The pigs to which it was thrown in small quantities daily ate it with avidity, and were quite evidently much benefited by the same.

Sheep were allowed to feed upon lot 5, and ate it down quite close. As soon as turned upon the rape, they began to improve in flesh.

Lambs pastured on a part of lot 1 did well for some time, but did not seem to thrive so well after a few weeks. The rape, however, was not at fault, I think.

The greatest value of the crop would appear to be as a pasture for pigs.

A study of six pigs put to pasture on lot 4, August 14 last, is most interesting. The data obtained is as follows:—

LOT OF SIX PIGS ON RAPE PASTURE.

No. of Pig.	Weights.							
	Aug. 14.	Aug. 28.	Sept. 11.	Sept. 25.	Oct. 9.	Oct. 16.	Oct. 30.	Dec. 6.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
279	61	76	80	85	96	108	129	175
280	60	73	80	95	105	121	147	195
281	64	73	91	103	111	127	150	201
282	60	73	90	99	109	120	143	171
283	60	72	82	99	114	135	157	203
284	53	68	76	90	105	118	141	182
Total	358	435	499	571	640	729	867	1,127
Total gain	....	87	64	72	69	89	138	260
Daily rate of gain in lbs	....	1·03	0·76	0·85	0·82	2·12	1·64	1·20
Daily grain ration	....	1	$1\frac{1}{2}$	$1\frac{3}{4}$	2	3	4	5

STATEMENT of cost of proceeds of the above lot of six pigs :—

To 6 pigs at $3	$18 00
3-16 acres rape at $14.17 per acre	2 66
2,067 lbs. meal at 90c. per cwt	18 60
Gross cost	$39 26
By 1,127 lbs. pork at $6 per cwt	$67 62
Profit on lot	28 36
Profit per pig	4 73

From a study of the habits of the pigs pasturing on plot 4, I should say that the best results would be secured by sowing the rape in rows 24 to 30 inches apart at the rate of about 3 pounds of seed (Dwarf Essex) to the acre. When thus sown this can be cultivated by horse-power when young, and has a tendency to branch out and develop a large leaf crop rather than go to stem.

It is most interesting to watch the niceness of discrimination exercised by your practised rape-eating pig, as he strolls leisurely down the row and selects the juicy leaves that best please his fancy. I have observed too, that your trained pig is equal to the best of chemists in picking out those parts of the plant most valuable for food. He soon learns to shun the large or old leaves, and feasts upon the young, the tender, the juicy. A study of the chemistry of the plant will be found in the report of Mr. F. T. Shutt, Chemist of the Experimental Farms.

Below is a statement of the cost of producing the forage :—

Cost of Growing One Acre of Rape.

Rent of land	$3 00
Cultivating in autumn	1 50
Ploughing in spring	2 00
½ manure applied at rate of 20 tons per acre and valued at $1 per ton	4 00
Harrowing twice	0 50
Seeding 1½ hours	0 37
Seed, 3 lbs. at 10c	0 30
Hoeing 3 times, 2 days at $1.25	2 50
	$14 17

Yielded 30 tons.

Cost of producing 1 ton	47 cents
Average dry matter per ton	200 lbs.
Cost of 100 lbs. dry matter	23½ cents

PUMPKINS.

Part of the second year of the rotation area was devoted to pumpkins. The portion selected was adjoining the autumn pasture for convenience in feeding. The soil was a sandy loam, and fairly well drained. Manure was first applied at the usual rate of 15 tons per acre, worked into the soil. The plot was then thoroughly cultivated and harrowed. It was marked off into 8-foot squares, and a small hole about 18 inches square and 6 inches deep excavated at each corner. This was filled about half full of barnyard manure (scrapings), a layer of earth thrown over it, and the seeds planted in this layer.

The plants grew apace, and in a short time covered the whole area. Much fruit developed, and grew to a fair size. The yield from the half acre being 1,250 pumpkins, averaging 14½ pounds, or about 9 tons.

These were fed partly to the dairy cattle, which seemed to do well upon them. A large number were fed to pigs. One lot fed on raw pumpkins did fairly well, making a gain of 745 pounds in 107 days, at a cost of $3.08 per 100 pounds gain. They ate 2,090 pounds pumpkins and 1,981 pounds meal half corn, half oats, pease and barley equal parts.

Another lot of 6 pigs, fed on cooked pumpkins, did exceedingly well, making 706 pounds increase in 99 days, at a cost of $2.96 per 100 pounds gain. They ate 7,500 pounds pumpkins and 1,602 pounds meal.

Cost of Production.

Rent, ½ acre, at $3 per acre	$1 50
Cultivating in autumn	80
Ploughing in spring	1 00
Harrowing twice	20
Rolling	10
Manure, ⅕ of 7½ tons, at $1 per ton	1 50
Seed, 10 cents, and seeding, $1.70	1 80
Hoeing, 1 day	1 25
	$8 15

Total yield, 18,125 pounds. Cost of producing 1 ton, 90 cents.

One ton contains about 190 pounds digestible dry matter. Cost of producing 100 pounds digestible dry matter is 47 cents.

THE JERUSALEM ARTICHOKE *(Helianthus tuberosus.)*

A plant that is attracting some attention as yielding a plentiful supply of succulent and apparently rather nutritious food for pigs is the Jerusalem artichoke. Its value would, however, appear to be lessened by the great length of time required to mature the tubers or even produce them in any considerable bulk at the base of a plant.

A plot one sixteenth of an acre (10 square rods) in area was sown May 19, with about 70 pounds of tubers. They were planted 4 inches deep, in rows 24 inches apart and in hills about 20 inches apart in the rows. They required but little cultivation, as they soon grew so dense as to kill all other or less vigorous forms of plant life. The growth of the plant for about three months was confined to the stem, leaves and roots alone, no appreciable development of tubers being observable. In September young tubers made their appearance and slowly developed.

On October 3 only small tubers about the size of hen's eggs were found on digging, although the plants had made a most luxuriant growth, standing 10 to 13 feet high, and about 50 per cent of them being in flower.

Although the tubers were immature, it was decided in view of the lateness of the date to turn the pigs in at once. Accordingly on the above mentioned date six cross-bred pigs were turned free in the lot. They were allowed 1½ pounds of meal each per diem in addition to the artichokes, which they rooted out most industriously and ate most greedily. I have never seen pigs eat anything with more gusto.

The following table will give some idea of the progress made by this lot of pigs while on artichokes and so of the value of artichokes as a supplementary food for pigs:—

No. of Pig.	Weight, Oct. 3.	Weight, Oct. 24.	Gain.	Daily rate of Gain.	No. of Pig.	Weight, Oct. 3.	Weight, Oct. 24.	Gain.	Daily rate of Gain.
	Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.
263	100	131	31	1·47	269	109	145	36	1·71
264	105	141	36	1·71	271	95	127	32	1·52
267	106	138	32	1·52					
268	111	141	30	1·42	Total	626	823	197	1·57 Average

The daily average of 1·57 pounds is remarkable in pigs of such live weights, but becomes still more worthy of consideration when we remember the small amount of grain fed per diem.

During the twenty-one days the 6 pigs consumed 189 pounds of meal (½ corn, ½ oats, pease and barley equal parts), at 90 cents per cwt., $1.70, while the meat produced valued at current prices ($6.25 per cwt.), was worth $12.31, leaving a balance of $10.61 for the sixteenth of an acre of artichokes. Putting this in another way we have 197 pounds pork produced at a cost as follows :—

189 pounds meal at 90 cents		$ 1 70
One-sixteenth acre artichokes cost for seed	$ 0 50	
For planting, &c	1 00	
Rent, $5 per acre	0 35	
		1 85
Net cost		$ 2 55

That is one pound of pork produced at a cost of 1·8 cents.

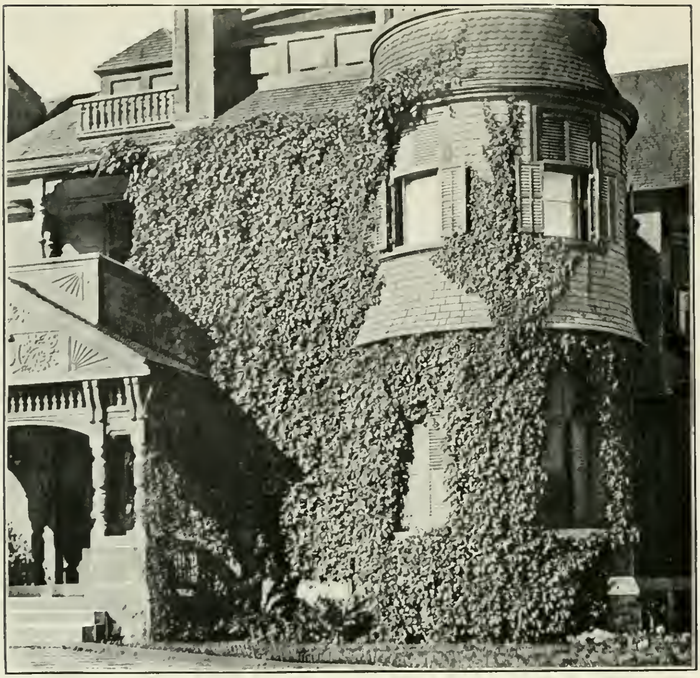
This tuber may be sown in the autumn and will then start to grow early the next year, or the crop may be left unharvested till the ensuing spring and the pigs allowed to root them out as soon as the frost comes out.

SUMMARY.

The following tables of cost of production of (1) a ton of stored forage or threshed grain, and (2) 100 pounds of digestible dry matter are submitted with the end in view of showing the comparative cost of producing each if not generally at least in one instance :—

Number.	(1). Cost of producing 1 ton of stored forage or threshed grain in the form of :	$ cts.	(2). Cost of producing 100 pounds of digestable dry matter as yielded by :	cts.
1	Rape	0 47	Barley straw	20
2	Pumpkins	0 90	Pea straw	21
3	Mangels	0 96	Rape	23·5
4	Corn (ensilage)	1 25	Oat straw	27
5	Carrots	1 37	Clover	30·6
6	Turnips	1 63	Mixed hay	43·6
7	Pea straw	1 73	Corn (ensilage)	44·4
8	Barley straw	1 83	Pumpkins	47
9	Sugar beets (for forage)	1 87	Sugar beets (for sugar)	48
10	" (for sugar)	2 14	Mangels	48
11	Oat straw	2 32	Sugar beets (for forage)	50
12	Clover	3 12	Barley	65·
13	Mixed hay	4 45	Carrots	68
14	Oats	9 21	Oats	73
15	Barley	10 07	Turnips	77
16	Pease	15 70	Pease	90.2

In speaking of the comparative cost of the above, both as stored material and as digestible dry matter, it is not attempting to differentiate their feeding values. It will not of course be understood that because a certain forage is produced at a small cost it will pay to feed or grow only that variety. Frequently when a form of digestible dry matter can be produced cheaply it is of a character to necessitate the addition of some more expensive material before being fed. An example of such a case would be afforded by barley straw which produced digestible dry matter at a cost of 20 cents per 100 pounds, which if fed exclusively would result in practically starving the animal, while a small addition of pea meal would make the ration a fairly good one.



Self-fastening Virginia Creeper growing on house of Director Central Experimental Farm.

Part of Apple Orchard, Central Experimental Farm, showing cover crop of Red Clover.

REPORT OF THE HORTICULTURIST.

(W. T. Macoun.)

Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit, herewith, the fourteenth annual report of this division. While space will not permit of going fully into the details of all the experiments which were conducted during the past year, nor of treating any one subject at great length, the aim has been, in preparing the following report, to present a summary of most of the work undertaken by the Horticulturist, and to give the results of such experiments as it was thought best to publish this year.

Character of Season.—The climate of the Ottawa Valley is, as a rule, very favourable to the production of such fruits as will endure the winters, and the weather this year was not exceptional in that respect. The atmospheric conditions which usually prevail in the valley seem to be such as to prevent any long continued drought in summer, and thus it is not often that there is too little rain. The winters are long and rather severe, but there is generally a good covering of snow to protect low growing plants and the roots of trees. The weather was very changeable last winter, there being no long spells of cold nor of mild weather. Up to March 1, there had not been more than from ten to twelve inches of snow on the ground at one time. During the third week of January nearly all the snow that was then lying on the ground disappeared. On March 1, 18 inches of snow fell, and on the following day 6 inches more. This came in a very opportune time, protecting the roots of the trees at a critical period of the year. The coldest day of the winter was on February 2, when the temperature fell to 21·5° F. below zero.

The snow gradually disappeared after the middle of March, but as there were few warm rains or little rain of any kind, the frost did not leave the ground readily and the spring was backward. The frost was out of the ground enough to use the spade on April 19, although it could still be found in spots for several weeks afterwards. Compared with last year, the opening of spring work was only one day later.

The weather remained quite cool until May 13. On the 10th and 11th of that month there were four and five degrees of frost respectively, but as there had been little growth up to that time very little injury was done. On May 14 the weather became quite warm, the temperature rising to 86° F. This was the first day that growth was at all rapid. While this rise in temperature was followed again by cool weather, the last week of the month was quite warm, the temperature being 81° F., 82° F., and 83° F., on the 26th, 27th and 28th. No frosts occurred after the 11th. June was a very favourable month for plant growth, their being sufficient rain to keep everything growing well. Most of the month of July was showery, but there were few storms and the weather, though warm at times, was never hot. August was also a favourable month for plant growth. On the 6th, the temperature was 90° F., and on the 26th, 91° F., these being the hottest days of the month.

September was an exceptionally fine month, until the third week, which was wet, the temperature, as a rule, being mild or warm. There was a light frost on the 19th, but only the melons were injured. The highest temperature of the year occurred on the 2nd, when it rose to 93·8° F. October began with fine weather in much the same way as September had ended, and there was no killing frost until the 17th, when the leaves on the grape vines were killed and the fruit injured. Such tender things as cannas and dahlias were also destroyed. The temperature on that day was 27·8° F. Much fine weather followed, and there was no more severe frost until November 13, when the temperature fell to 15° F. On the 14th, four inches of snow fell and remained, although, as the weather becoming mild, nearly all the frost came out of the ground, and more snow following, there was practically no frost in the ground up to the end of the month. Winter set in much earlier than usual this year.

Fruit Crop.—The past season was favourable to most fruits, the yield and quality, on the whole, being good. Many varieties of apples produced good crops, and as the trees have now been planted for twelve years, the quantity of fruit picked from them this year was considerable, some trees producing from 2½ to 3 barrels. Only a few pear trees fruited, as there are not many trees of a bearing age in the orchard, most of them having been killed by winter or blight from time to time. The crop of American plums was very good, and some of the newer varieties are quite promising. As with pears, very few trees of the European varieties of plums were old enough to bear, as these are killed out by the winter from time to time. The cherry crop was practically a failure, for, although some of the trees bloomed very well, little fruit set. Grapes did comparatively well, but not as much fruit set as usual. They were very slow in ripening, and if there had been early frosts few varieties would have matured. As it was, however, 81 kinds ripened, the fruit being of good quality, but not as well flavoured as when it ripens rapidly. The strawberry crop was exceptionally good and the picking season longer than usual. As prices for strawberries were high in Ottawa this year, local growers must have found them very remunerative Raspberries also did well, and the quality of the fruit was good. Currants were not as good as usual ; and although the American gooseberries did well, the European varieties produced very little fruit, as mildew was bad. The latter might have been controlled somewhat by spraying the bushes with potassium sulphide, but only the new plantation was sprayed.

PROGRESS OF THE WORK.

Owing to the favourable season this year, nearly everything made satisfactory progress in the horticultural department.

The work of top grafting the tenderer varieties of apples on hardy stocks was again a prominent feature of the work in the early spring.

During the winter, in the spring, and again in the autumn, experiments were conducted in spraying apple trees with a lime mixture to determine the best formula to use for the destruction of the oyster-shell bark-louse, which it had been found possible to remove by this means.

Cover crops have received special attention in this department during the past season, as in 1898 and 1899, the importance of having some covering in the orchard during the winter to protect the roots of the trees being fully recognized. Of all the cover crops tested here there is none as satisfactory as Mammoth Red or Common Red Clover.

Valuable data are being accumulated every year on the hardiness, productiveness, and quality of a large number of different kinds of fruits, and this year being a favourable one for fruits much information was gained, especially regarding varieties which had never fruited before.

There has not yet been found a hardy, late-keeping variety of apple suitable for growing for commercial purposes in northern and eastern Ontario and the Province of Quebec, which equals in quality, productiveness and appearance the best varieties grown in the more temperate parts of the provinces. A large number of seedlings of the best hardy apples which have fruited at the Central Experimental Farm have been grown, and will be planted out next spring, and it is hoped that in time, from such seedlings and from cross breeding, that some good, late-keeping, hardy sorts will be obtained.

Few of the European plums are sufficiently hardy to be grown profitably in such a cold climate as that at Ottawa, and on this account special attention has been given to the improved American plums, no pains having been spared to make the collection of varieties as complete as possible. The American plums are being very rapidly improved, and some of the best of those which have fruited here are so good that it is hard to believe they have developed from the wild type.

This autumn, part of the Russian orchard, in which the trees had not made satisfactory growth, was drained, and it is expected that the land will be very much improved and the trees succeed better in the future.

Experiments with vegetables were again carried on this year to a considerable extent, in order that information might be obtained which would assist the vegetable grower as well.

The Arboretum and the Botanic garden looked well this season, as there was sufficient rain to keep things fresh and green all summer. As the trees and shrubs develop, they become more interesting and attractive. A large number of additions were made to the collection again in the spring.

The perennial border had a good show of bloom from early spring until late autumn.

Large collections of seeds were received this year from various arboreta and botanic gardens, and many new things have been obtained in this way.

The correspondence, as usual, has occupied much time, but as this is one of the few ways in which the knowledge gained can be imparted to the public, the time devoted to it is well spent.

Meetings attended and Places visited.—During the past year meetings were attended and addresses given at nine different places. On February 20 and 21, I attended the winter meeting of the Quebec Pomological Society at Granby, Que., and gave an address on 'The Development of Spraying in Canada.' By arrangement with the secretary of the Ontario Fruit Growers' Association, addresses were given before seven of the horticultural societies affiliated with it, my subjects being 'The Lawn and Garden,' and 'The Flower and Fruit Garden.' These meetings were held at Napanee on March 12, Port Hope on March 13, Cobourg on March 14, Trenton on March 15, Picton on March 16, Stirling on March 18, and Belleville on the 19th. I attended the annual meeting of the Ontario Fruit Growers' Association, on December 19, 20 and 21, and delivered addresses on 'Results of Experiments in Growing Fruit at the Central Experimental Farm,' and 'Garden Favourites.'

During the month of June, I visited the Grimsby district and Niagara peninsula, and at Niagara examined the trees which had been sprayed with lime mixture the previous winter. The months of July and August were spent in Great Britain, Ireland, and at the Paris exposition, and while not absent on official business I endeavoured to learn as much as possible of the horticultural conditions in the places visited, and brought home much information which will be helpful to me in my work.

Acknowledgments.—It is again a pleasure to acknowledge the assistance which has been kindly furnished me by a large number of fruit growers throughout Canada. The knowledge which I have gained by this friendly co-operation has enabled me to be of much greater service to the fruit growers, generally, than I otherwise would be. Fellow-workers in the United States have also furnished me with much valuable information.

As I was absent about two months last summer in the old country, the responsibility of carrying on the work of the horticultural division fell on Mr. J. F. Watson, secretary, and Mr. H. Holz, foreman. I was very gratified on my return to find that the former had kept the correspondence and other work in the office in good order,

and that the latter had spared no pains to keep everything running smoothly and satisfactorily outside.

DONATIONS.

Sender.	Donations.
Annis, A. E., Dryden, Ont	Native pine and spruce trees.
Archambault, Jos., St. Lin, Que	Apple scions.
Arnold Arboretum, Jamaica Plains, Mass	Seeds of trees and shrubs.
Aylmer Pump Co., Aylmer, Ont	Barrel spray pump.
Beaman, E. C., Newcastle, Ont.	Scions of 14 varieties of pears.
Botanic Gardens, Saharunpore, N. India	Collection of seeds.
Brodie, R., Montreal, Que	Sciôns of Sunset Russet apple and Isham crab apple.
Carruthers, Jas., Magundy, N.B	Potatoes.
Carter, J. H., Massawippi, Que	Scions of Pomme de Fer apple.
Chapais, J. C., L'Lslet, Que	Plum scions.
Craig, Prof. John, Ames, Iowa	Apple scions.
Curry, S. L., Weldon, Iowa	Scions of Curry plum.
Dempsey, W. H., Trenton, Ont	Samples of fruit ; apple scions.
Elm City Nursery Co., New Haven, Conn	1 tree Hinman Peach; 1 Meeker cherry tree.
Ferguson, A., Port Morien, C.B., N.S	Potatoes.
Gow, J. E., Windsor, Ont	Plant of prickley pear cactus.
Hamilton, R., Grenville, Que.	Scions of Blair and Childs' crab apples.
Hansen, Prof., Brookings, S.D., U.S	Scions of Odegard plum.
Imperial Botanic Gardens, St. Petersburg, Russia	Collection seeds.
Johnston, Asa, East Farnham, Que	Scions of Bethel apple.
Johnstone, John, Long River, P.E.I	Native spruce trees.
Jones, Harold, Maitland, Ont	Seedling pear trees.
Jones & Conard, New Grove, Pa	Plant New Century rose.
Lamb, Jas., Walkerton, Ont	Potatoes.
Matheson, D., Ottawa, Ont	Grape cuttings.
Newman, C. P., Lachine Locks, Que	Scions of 2 seedling apples.
Oren, J. K., Brandon, Iowa	13 Oren plum trees.
Peterson, P. S., & Son, Chicago, Ill	Cuttings of trees and shrubs.
Pitcher, Rev. J. T., Smith's Falls, Ont	Lily bulbs.
Reid, W. C., Belleville, Ont	Two trees of Akin red apple.
Robson, W. E., Minden, Ont	Scions of Jesmona apple.
Royal Botanic Gardens, Kew, England	Willow cuttings ; collection of seeds.
Shepherd, R. W., Como, Que	Scions of Red Canada and Switzer apples.
Snaison, R. A., Uxbridge, Ont	Potatoes.
Snelling, W. H., New Edinburgh, Ont.	Two seedling plum trees.
Snow, C. H., Cummings Bridge, Ont	Strawberry plants.
Starr, R. W., Wolfville, N.S	Plum trees and hardy roses.
Stevenson, A. P., Nelson, Man	Scions of Peerless apple.
Strachan, Alex., Southampton, Ont	Potatoes.
Tait, David, Iron Bridge, Ont	Scions of Kirkland apple and Warner pear.
Todd, F. G. Montreal	Six large specimens of *Rhododendron maximum*.
Trotter, Miss L., Owen Sound, Ont	Pear scions.
Walker, Jos., Strathroy, Ont	Scions of unknown apple.
Webster, F. Ashbrook, Arbroath, Scotland	Rose bushes.
Wile, S., Branch la Have, N.S.	Potatoes.
Young, C., Richards Landing, Ont	Scions of Charlamoff apple.

I have the honour to be, sir,

Your obedient servant,

W. T. MACOUN,

Horticulturist.

APPLES.

The trees in the apple orchard continue to make good growth, on the whole. Every year, however, some of them die, and the proportion of deaths is greatest among the oldest trees, which have now been planted twelve years. The varieties which suffer most are those of Russian origin, Duchess of Oldenburg, especially, being one of the number. The trees are usually blown down by storms, and on examination it is found that most of the roots, and nearly all the wood in the trunk, is rotten. Duchess of Oldenburg is considered one of the hardiest varieties of apples grown, but the trees are probably weakened by overbearing. Some of the Russian apples are growing in soil which has not been hitherto thoroughly drained, and this may be one of the causes of their early death. The Duchess trees however, are growing in the best soil in the orchard. Another cause of death may be that the roots, having nearly all been killed by winter in some previous year, did not supply sufficient sap to the tree, and hence it died or blew down because there were not enough roots to hold it in place. There is considerable evidence to show that this is one of the principal causes of death. In former years some of the trees were badly affected with blight, many large branches having been removed. It is possible that this disease remained in parts of the trees and caused decay to set in. There has not been very much blight (until this year), and very little root-killing since 1896, and the trees planted since that time are doing well. It very often happens, however, that trees which are quite healthy when young, soon die when they begin to bear heavily.

There was practically no root-killing of apple trees last winter, as there was a good covering of snow during the latter part of the winter, and an excellent cover crop of red clover in the orchards, and in some parts, Alfalfa clover. As has been the custom during the past three seasons, the clover was cut and let lie on the ground to rot. Owing to other pressing work, it was not possible to cut it the first time just as the flower heads were beginning to show, and it was in full bloom before it was mown, the result being that the plants were considerably weakened, and only four good crops were cut instead of five, which has been the case in the past. If then this system is adopted, the clover should be cut before the flowers are developed, if the best results are to be obtained.

A large number of trees bloomed well this year, but a smaller proportion of fruit set than is usual from the same amount of bloom. On examining some flower buds after the severe frosts of May 10 and 11, it was found that the pistils of those which were most advanced were, in many cases, destroyed, hence the frost had something to do with the fruit not setting as well as usual. The result, however, of the crop being thus lessened was that the apples were of much better size than if the trees had been heavily loaded. There have been 645 varieties of apples grown in the orchards and nurseries, and 193 varieties fruited this year.

The trees were thoroughly sprayed with Bordeaux mixture and Paris green as usual ; the early varieties receiving four applications, and the later ones five applications. There was no scab, and comparatively little fruit was injured by codling moth. It is now believed that the oyster-shell bark-louse can be kept well under control by spraying the trees with lime and water. The conclusions reached thus far being that two applications are sufficient. The best mixture has been found to be 2 pounds of lime to 1 gallon of water. Fuller directions for the use of this mixture will be found elsewhere. There were very few caterpillars this year, and no difficulty was found in killing what few there were.

The greatest injury to the trees was caused by fire blight. This began in the second week of June and continued throughout the summer. Very few trees, however, were badly injured, as in most cases only the smaller branches were affected, these being killed back from one to three feet, as a rule. In the Russian orchard, where most of the Russian varieties are, and where the blight made such ravages in 1895, the injury was comparatively small. In the standard orchard, however, where some of the Russian varieties are planted, the Tetofsky was badly blighted, the fruit spurs, which are very prominent on this variety, being nearly all destroyed. Of twenty-seven trees none escaped. The Wealthy also suffered considerably, though none of the trees were badly injured. The berried or Siberian crab (*Pyrus baccata*), was affected worse than any of the named varieties, some trees being completely killed. No preventive or any other satisfactory remedy has been found for this disease. The usual practice is to cut off the branch about a foot below the affected part as soon as the blight is noticed.

The work of top grafting the tenderer varieties of apples was continued this year. Unfortunately, a large proportion of the grafts set this year were destroyed by blight during the summer. Most of the trees grafted in 1898 and 1899, however, are doing well. None of them have yet been killed back by winter.

Apple growing as far north as Ottawa, and in a similar climate, is attended with many vissicitudes, and there is much yet to be learned regarding this important industry before one may be fairly certain of having trees live to be a good age.

PEARS.

Little success has attended the efforts made to grow pears at the Central Experimental Farm. It is true that a few of the Russian varieties live to be eight or ten years old, but blight comes suddenly and destroys them. These pears are also very inferior in quality and are really not worth growing where better pears can be bought cheaply on the market.

Up to this year, the young pear trees in the orchard had grown well since 1896, having not been affected by blight in 1897, 1898 and 1899, and it was thought that perhaps it would not appear again for some time, but this year the trees were affected again and by the time the summer was over many were dead, while others were killed back more or less badly. A tree of Flemish Beauty, planted in 1890, has been bearing lightly since 1897, and appears quite hardy. It was not affected by blight this year to any extent. Scions have been taken from this tree and grafted, and it will be interesting to learn whether the young trees will prove hardy and free from blight or not. This work will be continued, different stocks used, and other methods of grafting adopted, in the hope that a hardy strain of this fine pear will be obtained. The Longworth pear, which was originated in Iowa, is a very hardy variety and has proved free from blight here. A fair crop of fruit was produced this year, but it is of inferior quality. Season, September.

PLUMS.

The trees in the plum orchard continue to do well. There was a good crop of American plums, and fifty-eight varieties bore fruit this year. A few of the European plums fruited also.

The European and Japanese plums are so uncertain in climates as severe as that at Ottawa that they should not be planted for commercial purposes, unless the orchard has good protection, and even in that case there are but few that would give satisfaction.

It is necessary, therefore, to fall back on the American plums, and as these are being improved very rapidly by selection and by cross-breeding, and are perfectly hardy, they offer a strong inducement to plant plums for profit where the European or Japanese varieties will not produce paying crops. Men who have been growing these plums for some years in the vicinity of Ottawa are obtaining good prices for the these plums may be had from the last week of August, until the last week of September.

Although there are several species of American plums, only two of them furnish most of the varieties that are profitable to grow in Ontario and Quebec.

The species found in eastern Canada is *Prunus nigra*, Ait., the type of which is distinguished easily at a glance from *P. americana*, Marsh, in being darker in the bark and with a much stiffer and more upright habit than the latter. The fruit of *P. nigra* ripens, as a rule, earlier than that of *P. americana*, and is usually more evenly covered with red. Some varieties are good in quality, but, as a rule, are not as high flavoured as those of *americana*. This species, however, varies considerably and sometimes it is difficult to decide whether a variety is *P. nigra* or *P. americana*. The trees bear heavily and regularly, but if they are not kept thoroughly sprayed the fruit becomes affected with plum blight, and withers and falls before becoming ripe. The species called *P. americana* is not known to occur in Canada, although the form of wild plum growing in Manitoba is much like it, but is intermediate in some characteristics between the two. Its range is from New Jersey to Montana. The named varieties which have sprung from this species comprise most of the best kinds now offered for sale. This tree grows from 10 to 20 feet in height, is of spreading habit and is usually quite hardy where the native species grows. It bears heavily and regularly, as a rule, and the fruit of the best varieties is of good size and attractive appearance, and, although not equal in quality to the best European plums, is juicy, sweet, often high flavoured, and at all times refreshing. The skin is sometimes more or less acrid, but this is not apparent when eating some of the best varieties, although when canned or preserved, it sometimes develops, though often it does not. *P. americana* does not suffer from blight to any extent, and this is an important reason why varieties of it should be planted instead of *P. nigra*, unless the trees are properly sprayed.

The following technical descriptions of the two species, made by Waugh, give their distinguishing characteristics in greater detail and accuracy:—

'*P. americana*, Marsh.—Common Wild Plum. The type distinguished by entire calyx lobes, which are pubescent on the inner surface; stone turgid; leaves oval or slightly obovate; petioles mostly without glands. Tree spreading, ragged, thorny, 8 to 20 feet high; flowers large, white, on slender pedicels; leaves very coarsely veined, never glossy or shining; fruit more or less flattened upon the sides, firm and meaty, the skin tough and glaucous and never glossy, ripening through yellow to red. Occurs wild from New Jersey and New York to Montana and Colorado. It varies southward, in Texas and New Mexico represented mostly by the variety *mollis*.

'Var. *nigra*. Canada Plum, Red Plum (*P. nigra*, Ait., *P. americana* T. & G. and 6th ed. Gray's Manual.) In its extreme forms easily distinguished by the glandular-serrate calyx lobes, glabrous on the inner surface; compressed stone; broadly oblong-ovate to obovate leaves with petioles bearing two glands. Flowers large, white, with short thick peduncles conspicuously marked by the scars left by the falling of the bud scales; pedicels dark red, slender, glabrous; calyx tube broadly obconic, dark red on the outer and bright red on the inner surface; fruit oblong-oval, orange-red; stone nearly oval, compressed. Occurs wild from Newfoundland west to Rainy and Assiniboine rivers in Canada, and commonly in the New England States, where it is found along roadsides and in waste places.'

The plum has been well studied by Prof. F. A. Waugh, of Burlington, Vt., and through his work the fact has been established that practically all varieties of American plums are self-sterile. In other words, there would be no fruit in an orchard containing a number of trees of one variety only, unless the wind or insects carried pollen of other varieties to fertilize the flowers. This knowledge is of great importance to the fruit grower. It is another indication that 'nature abhors perpetual self-fertilization.' While a variety is self-sterile in itself, if it is fertilized by another self-sterile variety, fruit will be formed, and vice versa. It is necessary, then, if good crops are to be obtained, to have more than one variety growing in the orchard, to have the varieties bloom at the same time, and to have them of the same species, if possible; and, failing that, to have the species as closely related as possible.

At the Central Experimental Farm there are now 76 varieties of American plums, a large proportion of which have fruited, and following are descriptions of the best of them, with names of the varieties which may be used as pollenizers to fertilize them:—

AITKIN, *nigra.*—Ripe August 22, 1899, and August 24, 1900. Fruit large, oval, suture merely an obscure line; colour uniformly deep red all over; flesh deep yellow, juicy, sweet, but not rich nor high flavoured; stone large, flat, semi-cling; skin rather thin, tough and astringent. Quality above medium. Tree a vigorous upright grower and a medium bearer. As grown here, the only good points in this plum are its earliness and attractive appearance; but earliness is a very desirable characteristic, and it is worth planting on this account. Cheney, however, which follows it in ten or eleven days, is so much better in every way, and for home use, especially, that it is much to be preferred.

CHENEY, *nigra.*—Ripe September 2, 1899, September 4, 1900. Fruit large, oblong to roundish, suture distinct; colour uniformly purplish-red all over; flesh deep yellow, juicy, sweet, rich; stone of medium size, flat, cling; skin moderately thick, tough, without astringency. Quality good. Tree upright, vigorous, and a good bearer. This and Bixby are the two best early plums which have fruited here, and they should both be planted.

BIXBY, *americana.*—Ripe August 31, 1899, September 6, 1900. Fruit large, round; colour yellow, more or less covered with red; bloom rather heavy; flesh deep yellow, juicy, sweet, rich; stone of medium size, almost free; skin thick but tender and without astringency. Quality very good. Tree spreading, vigorous, and a heavy bearer. This is the earliest good plum of the *americana* group which has fruited here. It is well worth growing on account of its earliness, productiveness and quality. It does not ripen its fruit as early as some nor is it very firm, but on the whole it is a good plum.

GAYLORD, *americana.*—Ripe September 6, 1899, September 13, 1900. Fruit almost large, roundish, somewhat heart-shaped, suture distinct; colour yellow, almost covered with deep red, with a bloom; flesh deep yellow, juicy, sweet, rich; stone of medium size, free; skin moderately thick and fairly tender; slightly astringent. Quality good. Tree spreading, vigorous, and a good bearer. A fine plum.

NEW ULM, *americana.*—Ripe September 11, 1899, September 18, 1900. Fruit large, nearly round, somewhat heart-shaped, suture distinct; colour yellow, more or less covered with pink or purplish-red, sometimes the surface has a mottled appearance when the yellow shows through the red; bloom moderately heavy; flesh deep yellow, juicy, sweet; stone of medium size, cling. Skin thick and tough, but not astringent. Quality good. Tree vigorous, of a low, spreading habit, and a good bearer. This is a firm plum, and should prove a very useful sort for shipping.

WOLF, *americana.*—Ripe September 14, 1899, September 18, 1900. Fruit large, roundish to oval; suture fairly distinct; colour uniformly dull deep-red all over; bloom moderately heavy; flesh deep yellow, juicy, sweet, rich; stone large, cling; skin thick and tough, and but slightly astringent. Quality good. Tree somewhat spreading, vigorous, productive. The Wolf as grown at the Central Experimental Farm is different from that described by most writers; one great difference being that the one grown here has a cling stone. There is no other plum in our collection, however, which resembles it, hence the name will not be changed for the present. It is one of the very best of the American plums. The Wolf described by others is also said to be one of the best. When it fruits here the two will be compared.

CITY, *americana.*—Ripe September 14, 1899, September 18, 1900. Fruit large, round; suture distinct; colour yellow, almost covered with red, but not of a very attractive shade; bloom moderately heavy; flesh yellow, juicy, sweet; stone of medium size, free; skin thick, moderately tender, slightly astringent. Quality good. Tree low growing, spreading, vigorous and productive. The fruit of this variety is firm, and should ship well. It is spoken highly of elsewhere also.

Silas Wilson, *americana.*—Ripe September 18, 1900. Fruit very large, roundish; suture distinct ; colour yellow, more or less mottled with purplish-red ; bloom moderately heavy ; flesh yellow, juicy, sweet, rich ; stone above medium size, semi-cling ; skin moderately thick, fairly tender, not astringent ; quality very good. Tree spreading, vigorous. This is the first year that this variety has fruited here, but if it is productive it should prove one of the most valuable. It is the largest and best in quality of all the American plums which have yet fruited here.

Stoddard, *americana.*—Ripe September 19, 1899, September 18, 1900. Fruit very large, almost round ; suture distinct ; colour yellow, almost covered with purplish or coppery red ; bloom moderately heavy ; flesh yellow, juicy, sweet, rich ; stone large, cling ; skin thick, but moderately tender, not astringent. Quality very good. Tree vigorous, spreading and moderately productive. On account of its size, appearance and quality, this is one of the best of this class of plums. Next to Silas Wilson, it is the best in quality of those which have fruited here.

Hawkeye, *americana.*—Ripe September 22, 1900. Fruit large, roundish; suture distinct ; colour deep purplish-red ; bloom heavy ; flesh deep yellow, juicy, moderately rich ; stone large, flat, cling ; skin thick and tough, but not astringent. Quality good. Tree vigorous, spreading, productive. This variety resembles Stoddard very much, but is not as good in quality. It is, however, a very valuable sort.

Wyant, *americana.*—Ripe September 19, 1899, September 22, 1900. Fruit very large, irregular, roundish, somewhat flattened ; suture distinct ; colour yellow, but well washed and mottled with dull deep red ; bloom moderately heavy; flesh yellow, fairly juicy, sweet ; stone large, free ; skin moderately thick and tough, astringent ; quality medium. Tree vigorous, spreading. Has not proved productive here, but has elsewhere.

American Eagle, *americana.*—Ripe September 22, 1900. Fruit large, roundish, somewhat oval ; suture distinct ; colour deep purplish-red ; bloom moderately heavy ; flesh yellow, juicy, sweet ; stone of medium size, cling ; skin thick and tough, not astringent. Quality good. Tree vigorous. This is the first year that this variety has fruited here, but it promises to be a very useful sort. It is spoken of highly by others.

Hammer, *hortulana.*—Ripe September 25, 1899, September 27, 1900. Fruit large, roundish ; suture distinct ; colour dark, dull red ; bloom heavy. The bloom brightens up this variety and gives it a very attractive appearance. Flesh deep yellow, juicy, sweet, with the peculiar flavour of the Miner plum ; stone medium in size, semi-cling ; skin thick and tough. Quality good. Tree vigorous, spreading, productive. This variety extends the season of the American plums very considerably. It has one drawback in the fact that it cracks easily. It is a hybrid between *Prunus americana* and *P. hortulana,* and on this account is hardier than if it were pure *hortulana.* Where a late plum is desired, this is a good variety to plant.

There are some other varieties which have been highly spoken of, and which, although being tested here, have not yet fruited. Among these may be mentioned Odegard (recommended for its extreme earliness), Legal Tender, Oren, Brittlewood, Terry, Smith and Kieth. The Surprise plum, which is said to be one of the best, if not the best, in quality, may not be hardy enough for the coldest parts of this country, as it is of the *hortulana* group, but it is said to be one of the hardiest of that group.

VARIETIES OF PLUMS AND THEIR POLLINATORS.

Cheney, Gaylord, New Ulm, Silas Wilson, City, will pollinate one another.

Bixby, Wolf, Stoddard, Haweye, Wyant, American Eagle, Hammer will pollinate one another.

Aitkin has no good pollinator among the other varieties recommended, as it is a very early bloomer, Cheney, which comes nearest being one, is not in full bloom until six days later.

GRAPES.

In the annual report of the horticulturist for 1896, the grape was treated of at considerable length. There the methods of propagation, planting, cultivation, training and pruning the vines were well described. The various fertilizers for use in the vineyard were also mentioned. Recommendations were made on the thinning, spraying, picking and packing of the fruit, and a table published giving descriptions of the varieties tested at the Central Experimental Farm, with date of planting, origin, vigour, and date of blooming and date of ripening, colour and yield of fruit. Notes were also published on the relative value of the different varieties for wine or dessert purposes.

The information given in the report for 1896 is just as valuable now as it was then, and it is, therefore, not necessary at present to again describe the culture of the grape in full. As the horizontal arm system there described is probably the best one to adopt in those parts of Canada where the grape is not grown on a commercial scale, and where the vines have to be covered with soil every winter, the description of that method, which was published in 1896, is herewith given again, with such additional notes as are thought necessary :—

Horizontal System.—'This method of training is especially adapted to sections of the country where it is advisable to give the vines winter protection. Two strong canes are trained in opposite directions. The laterals springing from these are trained perpendicularly. In the autumn the laterals are cut back to two spurs. When the spurs become weak they are renewed, as is an entire arm, occasionally. This system calls for a four-wired trellis, in order to properly tie the strong laterals.'

As the vines have to be bent down and covered with soil every winter to protect them, more emphasis should be laid on the necessity of renewing the arms from time to time. When the arms get large and stiff they are hard to bend, and more soil is required to cover them. Furthermore, the buds become weak on old arms, and after a time do not grow at all, except at the outer extremity, so that it is very important to renew them as soon as anything of this kind is apparent. A good crop of fruit will be produced on arms of the previous season's growth if the root from which they spring is more than two years of age. It is important also when starting the arms to get them from within a foot of the ground. If there is a high stub it is so much more difficult to cover.

It is difficult to describe the summer pruning of the vine, but experience will soon teach what is necessary. It will be found that more laterals will grow than are desired to bear the crop which is wanted. These should be pinched out. Suckers will also grow, which should likewise be destroyed, as should all side-shoots from the laterals which are bearing the fruit. The main object in thus thinning out the vines is to allow the fruit to get plenty of sunshine.

The vines are protected in winter by simply bending them down and covering them with enough soil to hold them in place.

The season of 1900 was not very favourable for grapes at Ottawa, although 81 varieties matured at the Experimental Farm, but they were not as good in quality as in some years. It was very showery all summer, and this caused a greater growth of vine than was best for the proper development and ripening of the fruit. While there were no early frosts in autumn to injure the vines or fruit, the weather was not warm enough to induce rapid ripening, and on this account the grapes were not as sweet as they sometimes are.

Red clover seed was sown in the vineyard on July 21, and a good cover crop was formed by autumn. This will help to hold the snow and afford a better protection to the roots of the vines. It will also be useful for ploughing under in the spring. This autumn, the work of renewing the old arms was continued, most of them having now been treated in this way.

As it is important to know what varieties of grapes are likely to ripen every season in places where only the earliest sorts will mature, the following table is given, in which will be found fifteen of the very earliest sorts growing at the Central Experimental Farm. These varieties have been obtained by selecting them from the earliest twenty-five of the past three years. The year 1898 was very favourable for the ripening of grapes. The year 1899 was just the reverse, September being cool and wet and severe frosts coming early. This year it was intermediate between the other two as, while no severe frosts occurred until late, the weather was not warm enough to cause the fruit to ripen rapidly. The varieties, then, which have ripened earliest in all of the past three years, should be certain to ripen almost every year.

LIST OF FIFTEEN OF THE EARLIEST VARIETIES OF GRAPES.

Name.	Date of Ripening.	Date of Ripening.	Date of Ripening.	Average date of Ripening.	Colour of Fruit.	Size of Fruit.	Quality of Fruit
	1898.	1899.	1900.	1898-1900.			
Florence..	Sept. 2..	Sept. 7..	Sept. 10..	Sept. 7..	Black ...	Above medium..	Poor.
Champion.......	" 3..	" 17..	" 18..	" 13..	" ...	" " ..	"
Pattison.... ..	" 6..	" 23..	" 12..	" 14..	" ...	Medium	Medium.
Moore's Early ..	" 6..	" 21..	" 24..	" 17..	" ...	Above medium..	Above medium.
Moyer....... ...	" 6..	" 23..	" 25..	" 18..	Red......	Below " ..	Good.
Golden Drop....	" 10..	" 17..	" 26..	" 18..	White..	Small.... .	Above medium.
Peabody..	" 6..	" 23..	" 28..	" 19..	Black ..	Below medium..	" "
Canada.........	" 10..	" 23..	" 26..	" 20..	"	Small..	" "
Telegraph	" 12..	" 23..	" 26..	" 20..	"	Above medium..	" "
Brant	" 13..	" 22..	" 26..	" 20..	"	Small	" "
Belvidere.......	" 10..	" 25..	Oct. 4..	" 23..	"	Medium........	" .
Early Victor....	" 10..	" 27..	" 2..	" 23 .	"	"	Medium.
Cottage.........	" 10..	" 27..	" 4..	" 24..	"	Above medium..	Above medium.
Marion.........	" 13..	" 29..	Sept. 29..	" 24..	" .	Below medium..	Medium.
Janesville	" 13..	" 23..	Oct. 5..	" 24..	" ...	Medium	"

It will be noticed that only one of these varieties is of good quality but, as has already been stated, these varieties are mentioned not for their quality but for their earliness. By referring to the reports of the horticulturist for former years, descriptions will be found of other and better sorts, but which are not quite so early. The Cambell's Early grape which will probably prove a valuable early variety has not yet fruited here and comparisons cannot yet be made with it.

RASPBERRIES.

A bulletin was published on the raspberry in 1895, in which the culture of this fruit was discussed and descriptions of many varieties given. Since that time, comparatively little has been published on this subject, the principal reason being that owing to the very unfavourable weather a large number of the bushes which comprised a plantation put out in the autumn of 1896, failed to grow. As the old plantation had been destroyed after the new one was made, there was no stock to draw from to fill in the vacancies until sufficient plants were grown. For this reason there had not been sufficient data to publish until this year, when a large number of the varieties became in a condition to admit of reliable results being obtained. In tho following table will be found the yields of the different varieties for the past season. A large number of these are cross-bred, and seedling sorts originated by Dr. Wm. Saunders, and this is the first year that comparative results have been published of them and the older named varieties. Some of the former are very productive and will probably, in time, take their place among the best varieties that are grown. The yields are, as a rule, from 12 bushes, planted in a row 36 feet long.

RASPBERRIES—TEST OF VARIETIES.

Name of Variety.	Date of First Ripe Fruit.	Date of First Picking.	Date of Last Picking.	Total Number of Pickings.	Total Yield.		Length of Row.	Remarks.
					Lbs.	Oz.	Ft.	
Red Varieties.								
Kenyon	July 14	July 16	Aug. 13	12	32	2	36	Large, firm, deep red, medium quality.
Henry	" 4	" 13	" 6	11	28	1	36	Above medium size, soft, good quality.
Brighton	" 7	" 13	" 9	10	27	2	36	Medium size, good quality.
Clarke	" 11	" 13	" 13	13	26	15	36	Large, deep red, good quality.
Count	" 7	" 13	" 9	12	26	13	36	Large, quality above medium.
Marlboro	" 9	" 13	" 13	13	24	9	36	Medium size, medium quality.
Muriel	" 8	" 13	" 9	11	22	10	36	Mediumsize,quality above medium.
Phœnix	" 9	" 16	" 17	13	21		36	Large, firm, medium quality.
Boyle	" 9	" 16	" 9	10	20	1	36	Medium size, medium quality.
Red Antwerp	" 11	" 13	" 9	11	16	12	36	Medium size, good quality.
Turner	" 11	" 13	" 13	13	16	7	36	Above medium, soft, good quality.
Herbert	" 11	" 13	" 13	12	15	14	36	Large, good quality.
Reliance	" 7	" 13	" 13	13	15	13	36	Medium size, poor quality.
Cassel	" 12	" 18	" 13	9	15	2	36	Above medium size, medium quality.
Garfield	" 11	" 16	" 13	12	15	2	36	Medium size, medium quality.
Lorne	" 7	" 13	" 13	12	14	11	36	Mediumsize,quality above medium.
Cardwell	" 10	" 16	" 9	10	14	11	36	Medium size, quality medium.
Nelson	" 11	" 13	" 9	11	14	3	36	Large, firm, quality above medium.
Trusty	" 6	" 13	" 13	12	13	7	36	Below medium size, soft, good quality.
Alma	" 11	" 13	" 13	12	12	15	36	Small, soft, poor quality.
Thompson's Early Prolific	" 9	" 13	" 13	13	12	10	36	Medium size, good quality.
Hornet	" 11	" 16	" 13	11	12	5	36	Medium size, medium quality.
Cardinal	" 12	" 20	" 13	9	12	4	36	Size above medium, medium quality.
King	" 7	" 13	" 17	14	11	3	36	Medium size, medium quality.
Craig	" 12	" 16	" 13	12	10	11	36	Above medium size, good quality.
Cuthbert	" 15	" 20	" 17	11	10	11	36	Large, firm, good quality.
Loudon	" 12	" 16	" 17	13	10	10	36	Large, good quality, not equal to Cuthbert.
Hansell	" 6	" 13	" 13	13	10	9	36	Medium size, good quality.
Heebner	" 12	" 18	" 13	11	10	6	36	Large, very good quality.
Herstine	" 12	" 18	" 9	8	8	7	36	Large, soft, good quality.
Biggar's Seedling	" 13	" 18	" 13	11	8	5	36	Below medium size.
Fontenoy	" 12	" 16	" 17	11	7	5	36	Large, soft, good quality.
Miller's Seedling	" 9	" 13	" 13	13	7	1	36	Medium size, medium quality.
Gladstone	" 7	" 13	July 27	6	6	9	36	Small, soft, good quality.
Deacon	" 12	" 18	Aug. 9	9	5	10	36	Medium size, medium quality.
Dora	" 12	" 18	" 1	5	5	6	36	Large, good quality.
Sir John	" 7	" 16	" 6	7	4	12	36	Medium size, good quality.
Baumforth	" 9	" 13	" 6	5	2	10	36	Large.
Empire	" 6	" 13	July 18	3	2	9	36	Medium size, medium quality.
Mary	" 16	" 18	" 25	4	2	5	36	Above medium size, good quality.

RASPBERRIES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Date of First Ripe Fruit.	Date of First Picking.	Date of Last Picking.	Total Number of Pickings.	Total Yield. Lbs.	Total Yield. Oz.	Length of Row. Ft.	Remarks.
Yellow Varieties.								
Caroline	July 16	July 20	Aug. 16	11	16	1	36	Medium size, medium quality.
Yellow Antwerp	" 12	" 16	" 9	8	11	4	36	Above medium size, good quality.
Golden Queen	" 16	" 23	" 13	9	8	1	36	Large, good quality.
Champlain	" 11	" 16	" 3	8	4	14	36	Large, soft, good quality.
Lady Anne	" 12	" 16	July 27	4	3	14	36	Medium size, medium quality.
Purple Varieties.								
Shinn	" 12	Aug. 13	" 13	13	27	8	36	Medium size, firm, quality above medium.
Duncan	" 14	" 18	" 13	10	18	15	36	Large, firm, quality above medium.
Shaffer	" 12	" 20	" 13	10	11	10	36	Large, good quality.
Ralph	" 16	" 20	" 9	8	8	7	36	Medium size, firm, good quality.
Percy	" 10	" 16	" 6	9	8	2	36	Large, firm, good quality.
Columbian	" 18	" 23	" 13	9	7	7	36	Resembles Shaffer, but milder and firmer.

RASPBERRIES GROWN IN LARGER PLANTATIONS.

Cuthbert (Red)		July 18	Aug. 16	12	92	7	236	Large, firm, good quality.
Sarah "		" 20	" 13	9	67	7	236	Large, firm, late, very good quality.
Heebner "		" 18	" 16	12	43	2	236	Large, bright red, very good quality.
Golden Queen (Yellow)		" 20	" 16	11	45	8	236	Large, yellow, good quality.
Progress (Black Cap)		" 14	" 13	11	84	5	236	Medium size, black, juicy, good quality.
Hilborn "		" 18	" 13	12	71	14	236	Medium size, black, juicy, very good quality.
Older "		" 15	" 9	10	47	3	236	Large, black, juicy, good quality.
Shaffer (Purple)		" 18	" 16	12	72	12	236	Large, purple, good quality.

CURRANTS.

The currant crop was not good this year. The bushes suffered considerably during last winter, and in the spring it was found that much of the bearing wood was dead. They have, however, made good growth this season, and a fair crop should be obtained next year. A new plantation will be started in the spring, as most of the old bushes have been planted since 1893, and by the time the new ones are in full bearing it will be time to root the old ones out.

The table giving the names of varieties with yields, &c., which was published last year, is again repeated with the yields of this year, and the average yield of the past three years included.

CURRANTS—TEST OF VARIETIES.

CURRANTS—RED.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per bush 1898.		Average Yield per bush 1899.		Average Yield per bush 1900.		Average Yield for three years.	
		1899.			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Red Dutch	1893	July 7.	Small to medium	6	39	4	6	10	12	5	6	9	8	8
Raby Castle	1893	" 9.	" "	6	34	15	4	10	10	6	5	13	6	15
Red Grape	1893	" 8.	Above medium	6	16	15	5	1	10	13	2	13	6	4
Greenfield	1893	" 9.	Medium to large	6	20	8	7	9	7	3	3	7	6	1
London	1893	" 11.	Large	6	28	6	5	14	6	3	4	12	5	10
Early Scarlet	1893	" 7.	Medium	6	29	8	5	7	4	15	4	15	5	2
La Conde	1893	" 7.	"	4	8	8	4	10	6	7	2	2	4	6
Cherry	1893	" 8.	Small to medium	6	19	3½	4	4	4	1	3	3	3	13
North Star	1893	" 7.	Above medium	6	25	12	3	0	3	9	4	5	3	10
Wilder	1893	" 8.	Large	6	19	4	4	13	2	8	3	3	3	8
Ribes Striatum	1893	" 16.	Small	6	13	8	0	12	4	1	2	4	2	6
Prince Albert	1893	" 10.	Large	6	13	0	2	3	1	2	2	3	1	13
Fay's Prolific	1893	" 10.	Very large	6	3	3	0	12	2	10	0	8	1	5
Versaillaise	1893	" 7.	"	5	4	3	2	2	0	4	0	13	1	1
Simcoe King	1896	" 9.	Large	4	8	12	....		0	13	2	3	....	
Moore's Ruby	1893	" 10.	"	3	1	10½	....		0	2	0	9	....	
Cumberland Red	1896	" 8.	"	3	1	9	....		4	3	0	8	....	

WHITE.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per bush 1898.		Average Yield per bush 1899.		Average Yield per bush 1900.		Average Yield for three years.	
Climax	1893	July 10.	Large	6	28	8	3	15	3	10	4	12	4	2
White Grape	1893	" 10.	"	6	4	4	3	15	1	7	0	11	2	0
White Dutch	1893	" 8.	Medium	6	3	12	0	12	2	1	0	10	1	2

BLACK.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per bush 1898.		Average Yield per bush 1899.		Average Yield per bush 1900.		Average Yield for three years.	
Kerry	1893	July 14.	Above med. to large	6	20	2	5	4	7	9	3	6	5	6
Ontario	1893	" 14.	Medium to large	6	17	8	3	7	9	4	2	15	5	3
Eagle	1893	" 12.	Med. to above med.	6	13	5	4	4	8	9	2	3	5	0
Ethel	1893	" 13.	" "	6	10	10	5	8	4	5	1	12	3	14
Climax	1893	" 14.	Above med. to large	6	5	2	4	0	6	6	0	14	3	12
Clipper	1893	" 14	Medium to large	6	17	8	2	8	5	10	2	15	3	11
Success	1893	" 9.	Large	6	16	4	1	14	5	14	2	11	3	8
Stewart	1893	" 14.	Small to medium	6	7	4	4	15	3	15	1	3	3	6
Perry	1893	" 16.	" "	6	6	5	2	2	5	14	1	1	3	0
Orton	1893	" 10.	Large	6	4	12	3	0	4	11	0	13	2	13
Winona	1893	" 12	Above medium	6	5	5	2	5	4	15	0	14	2	11
Monarch	1893	" 14.	Medium to large	6	3	8	2	10	4	11	0	9	2	10
Charmer	1893	" 13.	Small to medium	6	2	6	4	2	3	0	0	6	2	8
Eclipse	1893	....	Medium to large	6	....		3	3	3	11	....		2	5
Prince of Wales	1893	" 14.	Small to medium	6	1	3	3	15	2	7	0	3	2	3
Beauty	1893	" 12.	Medium to large	6	2	1	2	5	3	12	0	5	2	2
Lee's Prolific	1893	" 13.	Medium	6	4	12	....		5	3	0	13	2	..
Standard	1893	" 12.	Large	6	5	2	2	12	2	4	0	14	1	15
Black English	1893	" 12.	"	6	2	15	2	2	2	14	0	8	1	13
Dominion	1893	" 12.	Medium	6	3	14	2	9	2	0	0	10	1	12
Ogden	1893	" 12.	"	5	2	1	2	9	2	1	0	7	1	11
Stirling	1893	" 14.	"	6	1	3	2	6	1	14	0	3	1	8
Mattie	1893	....	Medium to large	6	....		3	2	1	2	....		1	7
Star	1893	" 14.	Medium	6	5	3	1	2	1	9	0	14	1	3
Lewis	1893	" 12.	Small to medium	5	5	15	0	10	0	3	1	3	0	11
Black Naples	1893	" 14.	Medium to large	5	0	9	0	15	2	6	0	2	1	2
Oxford	1893	....	Above medium	6	....		1	6	0	8	....		0	10
Perth	1893	....	Medium to large	6	....		0	10	0	13	....		0	8

The following varieties have been planted within the last three years :—

CURRANTS—RED.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per Bush 1899.		Average Yield per Bush 1900.	
					Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Moore's Seedling..	1898	July 8..	Very Large. ...	5	6	12	0	2	1	6
Benwell......	1898	" 8..	Medium...	6	5	2	0	$\frac{1}{3}$	0	14
Goliath..	1898	" 8..	"	6	4	10	0	2	0	12
Victoria Red.......	1898	" 7..	"	6	4	9	0	$\frac{1}{3}$	0	12
Defiance...	1898	" 9 .	"	6	2	14	0	$\frac{1}{4}$	0	8
Houghton Castle.........	1898	" 8..	"	5	2	8	0	$\frac{1}{3}$	0	8
La Fertile	1898	" 8..	Large........ ...	6	2	12	0	$\frac{1}{2}$	0	7
Knight's Large..... .. .	1897	" 9..	"	4	1	12	0	5	0	7
Wentworth Seedling......	1898	" 9..	Medium...	5	2	4	......	......	0	7
Pomona	1897	" 7..	....	6	2	0	......	......	0	5
Large Bunch Holland ...	1897	" 9..	. ...	4	1	1	......	......	0	4

CURRANTS—WHITE.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per Bush 1899.		Average Yield per Bush 1900.	
White Imperial.	1897	July 10..	Large...........	6	9	4	1	7	1	9
Wentworth Leviathan....	1898	" 9..	Medium	6	2	14	0	$\frac{1}{4}$	0	8
Transparent...... . .	1868	" 9...	"	6	1	9	0	1	0	4

CURRANTS—BLACK.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per Bush 1899.		Average Yield per Bush 1900.	
Victoria Black...	1898	July 18..	Very Large.......	6	8	5	1	1	1	6
Baldwin.................	1898	" 14..	Above Medium....	6	6	8	0	3	1	1
Black Grape	1898	" 18..	Large.......... .	6	4	6	0	6	0	12
Buddenborg's Black......	1898	" 16..	Very Large.... .	6	3	14	0	4	0	10
Imay's Prolific.....	1898	" 12..	Med. to above Md.	6	3	0	0	11	0	8
Black Prince............	1898	" 14..	Large...........	6	0	13	0	3	0	2
Collin's Prolific..........	1899	....	....	....	......	......	......	......	......	......

GOOSEBERRIES.

The gooseberries in the new plantation which was made last year, made good growth this season, the growth of the American varieties being, however, much greater than that of the European. The American varieties should begin to fruit next season.

STRAWBERRIES.

The strawberry is the most popular small fruit that is grown in Canada, one reason being that enough luscious berries to supply the family needs may be grown on a very small area of land, and hence, it is possible for a large number of people to grow strawberries. Because of its popularity, many questions are asked regarding the best varieties to plant and the best methods of cultivation.

Already two bulletins (No. 5 and No. 27) have been published at the Central Experimental Farm on the strawberry. So great has been the demand for these publications that the supply of both is exhausted. In order that those who have not these bulletins, nor any other information on strawberry culture, may know the chief factors in growing strawberries successfully, the subject is again briefly discussed herewith.

SOIL.

To grow strawberries successfully, the soil should be well drained. The kind of soil is not, as a rule, more important than the drainage of it. Warm soils, such as sandy loam, will produce early fruit, but the yields will not always be as large as on clay loam. Much, however, will depend on the richness of it. Soil which will grow good crops of roots will grow good strawberries. In any case, a soil should be chosen which does not bake naturally or which by thorough tillage may be brought into such good condition that it will not bake.

PREPARATION OF THE SOIL.

Soil should be chosen, if possible, that has been prepared, in a measure, by growing a crop of roots which have been heavily manured. After the roots or other crops have been removed in the autumn, the land should be stirred deeply, it being the best practice to use a subsoil plough after the ordinary kind for this purpose. By using the subsoil plough the soil may be loosened to the required depth without bringing the subsoil to the surface, which would probably be the case if it were ploughed very deep with the ordinary plough. Clover sod land. ploughed in the autumn, is also good, as the sod furnishes humus. In the spring the soil should be brought into a fine state of tilth with the harrows, and where it is thought best, it may be ploughed beforehand. A heavy dressing of manure, from 20 to 30 tons per acre should be applied to the land, either the previous year or in the spring. If it is applied in the spring, it should be thoroughly rotted and well incorporated with the soil. Fresh manure applied in the spring renders the soil too open. and the strawberry plants do not start to grow readily. The roots also are liable to dry up and the plants die. It is difficult to plant strawberries unless the manure is well rotted and mixed with the soil.

As no after top-dressing will be equal to manure ploughed under some time before the plants are set out, it is very important, where manure can be had, to make the ground rich beforehand. Thorough preparation of the soil is one of the most important matters in strawberry culture.

PLANTING.

Successful planting may be done either in the spring or autumn. Spring, however, is the most satisfactory time, as if the plants are set then, when the soil is in good condition, they will make rapid growth and many runners during the summer, if properly looked after, and produce a full crop of fruit the following season.

Planting, however, should be done while the soil is still cool and moist. If planted in the autumn, there will, as a rule, only be a light crop of fruit the following season, and unless the weather is favourable when the plants are set, and the soil is moist, there may be very little growth indeed. If planting is done in the autumn, it should be as soon as the plants can be obtained with sufficient roots and when the soil is moist.

The most satisfactory method of growing strawberries on a large scale in Canada is by what is known as the matted-row system. The plants are set from 12 to 15 inches apart in rows from 2½ to 3½ feet apart. If proper cultivation is given, there should be no trouble in having a matted row of plants 18 inches to 2 feet in width by autumn. Planting may either be done by opening a hole for the plant by bending a spade backwards and forwards in the soil and then setting the plant in it and tramping it in with the foot, or by using a trowel. The latter method will usually give the better results, as the roots can be spread when planting, and the plants have much better conditions for growing. Great care should be taken to have the crown of the plant just at the surface of the ground after it has been pressed in when planted. If it is too high, the results will be bad; and if too low, not much better.

CULTIVATION AND FORMING THE MATTED ROWS.

As the future crop will depend on the number and strength of the runners, it is very important to encourage rapid growth from the very start. Cultivation should begin as soon as possible after the plants have been set, and the surface soil should be kept quite loose and free from weeds until the cultivator interferes with the runners. The early cultivations should be deep, in order to loosen the soil in which the roots are to grow, and the after cultivations should be quite shallow, so as not to injure the roots. Hoeing will be necessary, occasionally, in order to destroy all weeds and loosen the soil close to the plants. Any blossoms which appear during the first season should be pinched off, and all the first runners should be destroyed, either with the cultivator or hoe. This is to make the parent plants as strong as possible before the runners which are to remain begin to grow. About the middle of July, or as soon as the strawberry season is over, the runners should be allowed to develop and take root. It will be found that some varieties form many, and some only a few. If very many are formed, they should be thinned out to from 3 to 6 inches apart, in order that the crowns may develop properly. The width of the rows will depend on the runners which are made. There should, however, be a path from 1 to 2 feet wide kept between the rows for the pickers to stand in.

HILL SYSTEM.

Large berries may be obtained by growing the plants in what is known as the 'Hill System.' The plants are set from 12 to 15 inches apart, in rows about 2 feet apart; the blossoms are kept pinched off the first season, as in the other system, and no runners whatever are allowed to form. By this method a very strong crown is developed; the plants, having more room, become very vigorous, and as a result, the fruit is much larger, and often as good crops are obtained as from the matted-row system. The plants should be protected in winter as when grown in the matted row. In the spring the crowns should be uncovered, but the mulch left on. This will help keep the soil moist and the fruit clean. If injury from heaving in winter is likely to occur, this system will not prove very satisfactory. There is also more labour connected with it than with the other.

WINTER PROTECTION.

After permanent frost has set in and the ground is quite solid, the plants should be covered with a light coat of clean straw, that which will not pack closely over the plants being the best. This will prevent the alternate thawing and freezing of the ground in the spring and protect the plants, if there is not much snow in the winter. While plants will often come through the winter without protection, it is best not to take any risks. After the frosty weather of early spring is over and before the plants begin to grow, they should be uncovered and the straw put between the rows to keep the fruit clean. As soon as the fruit has been picked, the straw should be removed altogether, the plantation weeded and the surface soil loosened with the cultivator, so that the runners may have a chance to root.

RENEWING THE PLANTATION.

If there is sufficient land available, the most satisfactory results will be obtained by only taking one crop off a plantation. It can easily be arranged to have one part always in full bearing. It is quite possible to obtain two good crops, and this is often done where it is not convenient to make a new plantation every year. But the older the plantation, the less the crop will be, as a rule. The fruit will also be smaller and weeds will become very plentiful.

FERTILIZERS.

As a rule the strawberry crop is greater and the fruit better in proportion to the richness of the soil that the plants grow in. This being the case the soil, if not naturally rich, should be made so. No fertilizer is so good for this purpose as barn-yard manure, as it adds more humus to the soil than any other and is a complete fertilizer. This should be applied, when it can be obtained, in the manner already described in the preparation of the soil. Leguminous crops, such as clover and pease, ploughed under in the autumn are also very useful in adding nitrogen and humus to the soil. As a fertilizer with a fair proportion of potash is required, there is nothing better than wood ashes to suply it. Wood ashes may be applied broadcast in the spring when the land is being prepared for the plants, at the rate of 50 to 100 bushels per acre. If it is not convenient to furnish the necessary nitrogen, phosphoric acid and potash by the proper use of barn-yard manure, green crops, and wood ashes, it will be necessary to use a judicious mixture of the more expensive fertilizers to supply it, such as nitrate of soda, ground bone, and muriate of potash.

POLLINATION.

It occasionally happens that a person who has a variety of strawberry which yields much better with him than other varieties which he has growing along side, concludes to discard all his other kinds and grow that one variety. He does so and is disappointed to find that he has very few berries, and these ill-shaped and worthless. He does not know what to think about it, but writes to the Experimental Farm to learn what is the matter. The reply is sent back: 'Are you aware that the flowers of strawberries may be perfect or imperfect, or bisexual and pistillate ; in other words, do you know that some varieties of strawberries produce blossoms which have both male and female organs, while other varieties have only female organs; if you do not, the solution of your difficulty is very easy ?'

The male and female organs in plants perform the same functions as in animals, the fine dust formed on the stamens, which is shed when the flower is in bloom, is the fertilizing agent, it falls on the pistil and fertilization takes place. If the stamens are absent, or nearly all absent, as is the case in imperfect or pistillate flowers, no fruit, or very little fruit is formed. If a perfect or bisexual flowering variety and an imperfect flowering variety are growing in close proximity the flowers on both will be fertilized, as insects and winds carry the pollen or dust from the perfect to the imperfect. It very often happens that imperfect flowering varieties produce the best crops when properly pollinated, and this experience may lead fruit-growers who are ignorant of the foregoing facts, to make the mistake of planting only one variety, which may be imperfect.

A row of a perfect flowering sort should be planted to about every three or four rows of an imperfect variety to have good results. Of course, it is not necessary to plant an imperfect variety at all, as there are plenty of good sorts which have perfect flowers. It is essential to have the perfect and imperfect varieties in full bloom at the same time, as if the former bloomed before the latter there would be no object in planting it as a pollinator.

VARIETIES.

There are now so many varieties of strawberries offered for sale that it is very puzzling to the intending planter to know just what sorts to select. Some varieties succeed better on certain kinds of soil and in certain districts than others, and the recommendations given as to the best varieties to plant should not be taken to mean that in all cases they will give better results than any others, but most of those which succeed best in one place will succeed best in others.

At the Central Experimental Farm there were 350 varieties tested during the past season. Of these, fully 75 per cent would not be worth growing anywhere where other kinds could be obtained. Probably over half of the kinds tested this season will be discarded next year.

The different varieties in the plantation are planted in rows 15 feet in length and 3½ feet apart, there being two rows of each kind. They have all been given as nearly uniform conditions as possible, and on the whole it was a fair test. Some of the tenderer varieties were more or less winter-killed last winter, but most of them came through in good condition. The season this year was a very good one for strawberries. In the following table the yields and other data is given of the twenty-five varieties which yielded best, the names being arranged in order of yield. The letter B stands for bisexual or perfect and the letter P for pistillate or imperfect flowers.

TWENTY-FIVE best Yielding varieties of Strawberries, 1900.

Name.	Bisexual. Pistillate.	Date of Full Bloom.	Date of first ripe Fruit.	Date of First Picking.	Date of last Picking.	Number of Pickings.	Weight of 25 average Berries.	Total Yield.
	Sex.						Oz.	Lbs. Oz.
Daisy	P.	June 8..	June 22..	June 23..	July 20..	12	10¾	33— 2½
Afton	P.	″ 7..	″ 20..	″ 23..	″ 20..	12	6¼	31— 6
Stevens' Early	P.	″ 6..	″ 20..	″ 23..	″ 17..	10	7¾	28— 5½
Warfield	P.	″ 8..	″ 23..	″ 25..	″ 17..	10	7½	27— 6¼
Carleton	P.	″ 8..	″ 26..	″ 27..	″ 17..	8	8¾	26— 2
Howard's 41	P.	″ 9..	″ 25..	July 2..	″ 20..	7	8¾	25— 2½
Mattie Warfield	P.	″ 8..	″ 25..	June 25..	″ 17 :	9	5½	22— 5½
Mele	P.	″ 7..	″ 23..	″ 27..	″ 18..	8	7¼	22— 3½
Wonderful	P.	″ 11..	″ 28..	July 4..	″ 20..	5	6¼	22— 1½
Bomba	P.	″ 8..	″ 23..	June 27..	″ 13..	7	7¾	21— 0¾
Buster	P.	″ 9..	″ 26..	″ 28..	″ 20..	8	10¾	20— 8¾
Maggie	P.	″ 6..	″ 20..	″ 23..	″ 17..	9	7¼	19— 8¼
Stone's Early	P.	″ 8..	″ 22..	″ 23..	. 20..	11	5¼	19— 4
Judsonia	B.	″ 8..	″ 25..	″ 28..	″ 20..	8	7½	19— 3¼
Thompson's Late	P.	″ 6..	″ 28..	″ 30..	″ 20..	7	4½	18—15½
Glen Mary	B.	″ 8..	″ 23..	″ 27..	″ 20..	9	11	18—12
Swindle	P.	″ 8..	″ 23..	″ 27 .	″ 20..	8	8¼	17—11¼
Williams	B.	″ 8..	″ 25..	July 4..	″ 14..	5	7½	17— 9½
Enhance	B.	″ 7..	″ 25..	″ 2..	″ 20..	7	9½	16— 4
Sam Sperry	B.	″ 9..	July 2..	″ 4..	″ 20..	5	7½	15—14¾
John Little	P.	″ 8 .	June 18..	June 23..	″ 17..	10	4⅝	15—11
No Name	B.	″ 8..	″ 23..	″ 25..	″ 13..	8	9½	15— 9¾
Hattie Warfield	P.	″ 8..	″ 25..	″ 27..	″ 17..	7	7	15— 9½
Dora	P.	″ 8..	″ 25..	″ 25..	″ 17..	8	6	15— 4½
Satisfaction	B.	″ 8..	″ 27..	July 2..	″ 17..	6	9¼	15— 2

Although the twenty-five varieties in the preceding table yielded better than any other sorts this year, they are not necessarily, on that account, the best kinds to plant, as some of them do not always yield as well, while others are not of good size or quality.

The following twenty-one varieties, of which descriptions are given, are the best of all those which have been tested at the Central Experimental Farm during the past few years; the experience of other growers being also taken into consideration in the selection:—

Afton, P.—Fruit above medium size, round-conical, regular, firm, deep glossy red, acid. Quality medium. Season medium. Plant a strong grower. This proved a heavy cropper this year. The fruit is attractive looking, resembling Warfield very much.

Beder Wood, B.—Fruit medium size, round-conical, regular, rather soft, pale red, acid. Quality medium. Season early. Plant a strong grower. Although this variety does not appear among the twenty-five yielding best this year, it has yielded well here in the past and has given good satisfaction elsewhere. It is specially useful as a pollinator of other early sorts.

Bubach, P.—Fruit large to very large, wedge-conical, irregular, bright red, moderately firm, sub-acid. Quality good. Season medium. Plant healthy, but does not set many runners. It is a favourite amateur berry, and is well adapted for the hill system. It is not productive enough to be grown extensively for commercial purposes except on very rich ground.

Brandywine, B.—Fruit above medium to large, roundish or sugarloaf in shape, firm, deep red, brisk sub-acid, good flavour. Quality very good. Season late. Plant a strong grower. This is rather an uncertain berry, but when the season is favourable it does well, and on account of its lateness and fine flavour should be planted in the home garden.

Buster, P.—Fruit large, roundish, regular, bright, but inclined to be pale red, moderately firm, juicy, sub-acid. Quality above medium. Season medium to late. Plant a strong grower. This is a very productive variety of good size and attractive appearance, and it maintains its size well to the end of the picking season. It is one of the most promising varieties of those grown at Ottawa.

Carleton, P.—Fruit above medium size, roundish, regular, moderately firm, pale red, juicy, sub-acid, pleasant flavour. Quality good. Season late. Plant a strong grower. This is a productive seedling originated by Dr. W. Saunders, and on account of its late season should prove valuable.

Clyde, B.—Fruit large to very large, roundish, moderately firm, rather pale red, juicy, sub-acid, pleasant flavour. Quality good. Season medium. Plant healthy, but does not set runners freely. Has a small amount of foliage for the quantity of fruit. This is a very productive berry when given good culture on rich soil. Its popularity has increased more rapidly than any other variety during the past few years. It is rather light coloured for some markets, and not firm enough for others. Although this variety did not yield well enough this year to appear among the twenty-five most productive, in 1898 it yielded third best of 290 varieties.

Daisy, P.—Fruit above medium size, round-conical, rather soft, bright glossy red, juicy, acid. Quality medium. Plant a strong grower. Season medium. A very attractive looking berry, and the most productive this year. For a near market, where large berries of fine quality are not demanded, this should prove one of the most profitable sorts to grow.

Glen Mary, B.—Fruit very large, roundish to wedge-conical, irregular, moderately firm, bright red, juicy, sub-acid. Quality medium. Season medium. Plant a strong grower. This is one of the few large fruiting varieties which combine great productiveness with size of fruit, and is, therefore, a good kind for a commercial plantation.

Greenville, P.—Fruit large to very large, roundish or wedge-shaped, moderately firm, bright red, sub-acid, pleasant flavour. Quality good. Season medium. Plant a strong grower. This has not proved among the most productive, but it is one of the best for home use or special market.

Haverland, B.—Fruit above medium to large, pointed-conical, irregular, moderately firm, light scarlet, sub-acid. Quality medium. Season medium. Plant a strong grower. Haverland has proved a very productive and profitable berry with some growers in the vicinity of Ottawa, but it has not yielded very well with us. It appears to succeed best on heavy soil; that at the Experimental Farm is light.

Howard's No. 41, P.—Fruit medium size, round or pointed-conical, firm, bright red, acid. Quality medium. Season late. Plant a very strong grower. This is one of the most productive late berries that has yet been tested. It yielded sixth best this year. Where late berries are required without reference to quality this should prove one of the most profitable kinds to plant.

Marshall, B.—Fruit large to very large, roundish, rather irregular, firm, dark red, sub-acid, high flavour. Quality very good. Season medium. Plant vigorous, but few runners are set. This is one of the finest strawberries in cultivation. Its great size, rich colour and excellent quality make it an almost ideal berry for the table. It is, however, not very productive and needs high cultivation to be profitable. It is well adapted for growing in the hill system.

Nick Ohmer, B.—Fruit large, roundish, firm, deep red, sub-acid. Quality good. Season medium to late. Plant vigorous. Has not so far proved productive, but is a berry of fine appearance and would sell well. It is well spoken of elsewhere.

Parker Earle, B.—Fruit large, roundish, elongated, moderately firm, rather pale red, sub-acid. Quality above medium. Season late. Plant a strong grower. In some places the Parker Earle has given great satisfaction on account of its productiveness. At the Experimental Farm it has not done as well as many others.

Ridgeway, B.—Fruit medium size, roundish, firm, bright red, sub-acid. Quality good. Season late. Plant a strong grower, but does not set runners freely. Has not yielded well at the Experimental Farm, but has done well elsewhere.

Sample,P.—Fruit large, pointed-conical, moderately firm, bright red, acid. Quality above medium. Season medium to late. Plant a strong grower. Has not been long enough tested here to thoroughly ascertain its merits. Well spoken of elsewhere.

Stevens' Early, P.—Fruit medium to above medium size, pointed-conical, sometimes round-conical, firm, bright to deep glossy red, acid. Quality medium. Season early. This variety was much the most productive early sort tested this year.

Warfield, P.—Fruit above medium to medium size, pointed-conical, moderately firm, deep glossy red, acid. Quality medium. Season fairly early. Plant is a very strong grower and one of the hardiest. This variety has proved one of the best commercial berries at the Central Experimental Farm. Its hardiness, great productiveness and attractive and regular shaped fruit are the chief points in its favour.

Williams, B.—Fruit large, wedge-conical, firm, deep glossy red, the tip often remaining white when the rest of the berry is ripe, sub-acid. Quality good. Season medium. Plant a strong grower. While this berry is not a good one from the consumer's point of view, on account of the white tip, and also, often the hard core, it has proven very profitable to many growers, as it is productive and ships well.

William Belt, B.—Fruit large to very large, rather irregular, varying from wedge-conical to pointed-conical, the largest berries being cockscomb in shape. It is firm, bright red, brisk sub-acid. Very good quality. Season late. Plant a strong grower, but has not proved perfectly hardy here ; this defect, however, has not been heard of elsewhere. It is said to rust badly, but this has not been the experience at Ottawa. One of the best berries for home use.

Other comparatively new sorts which are being tested and which appear promising are : McKinley, Klondyke, Hood River, and Gladstone. The Senator Dunlap and Rough Rider, two varieties which have been much advertised recently, are also being tested. Mayflower was one of the most promising extra early varieties which fruited this year.

Of the twenty-one varieties described, the following are specially recommended for general and special markets and for home use. None of these varieties are extra early sorts, as it has been found that most of the very earliest kinds, such as Michel's Early, are such poor croppers that they are unprofitable. As it is important when planting varieties to plant those which bloom at the same time in close proximity, the dates of blooming of the different kinds are included in the table.

VARIETIES RECOMMENDED FOR A GENERAL MARKET.

Variety.	Sex.	Season.	Date of First Bloom.	Date of Full Bloom.	Date of 1st Picking.	Date of Last Picking.
			1900.	1900.	1900.	1900.
Warfield	Pistillate	Early	June 1	June 8	June 25	July 17
Beder Wood	Bisexual	"	May 30	" 7	" 23	" 17.
Clyde	"	E'ly to Med.	June 4	" 9	" 27	" 20
Glen Mary	"	Medium	" 1	" 8	" 27	" 17
Haverland	"	"	" 1	" 8	" 27	" 20
Williams	"	"	" 1	" 8	" 23	" 17
Buster	Pistillate	Late	" 4	" 9	" 28	" 20
Howard's No. 41	"	"	" 4	" 9	July 2	" 20

VARIETIES RECOMMENDED FOR A SPECIAL MARKET OR FOR HOME USE.

Marshall	Bisexual	Medium	June 1	June 8	June 27	July 17
Bubach	Pistillate	"	" 4	" 9	" 27	" 17
Greenville	"	"	" 1	" 8	" 25	" 17
Nick Ohmer	Bisexual	Med. to late	" 4	" 9	" 27	" 18
William Belt	"	Late	" 4	" 9	July 4	" 17
Brandywine	"	"	" 4	" 9	June 30	" 20

SEEDLING FRUITS.

Comparatively few seedling fruits were received for examination this year, and of these none were better or as good as the named varieties which succeed well in the districts from which the seedlings were sent. While it is very desirable that all seedlings of merit should become known, it has not been thought necessary to describe at full length any of the following kinds. As the collection of named varieties and unnamed seedlings is now very large at the Central Experimental Farm, there is a good opportunity of comparing the seedlings sent in with the best apples of the same season grown at Ottawa, and it is hoped that any who have seedlings whose merits they would like judged will send them to the horticulturist for this purpose.

No. 191—Robt. Hamilton, Grenville, Que.—Apple resembling La Victoire.

No. 192—Jules Lagace, St. Hilaire, Que.—Large streaked apple of medium quality.

No. 193—G. H. Caughell, Aylmer, Ont.—Medium sized, yellow, sweet summer apple.

No. 194—Thos. Orgill, Glen Orchard, Ont.—Small, red crab-like apple of rather poor quality.

No. 195—W. H. Lambert, Vaubrugh, Ont.—A medium sized, streaked, autumn apple of good quality.

No. 196—Alex. Skinner, Lindsay, Ont.—One of the most promising of those received. Large, red; quality above medium. Season, autumn.

No. 197—A. Clifford, Richard's Landing, Ont.—A large handsome apple, somewhat resembling Ben. Davis. Quality, medium. May be useful in the north.

No. 198—J. P. Cockburn, Gravenhurst, Ont.—An apple of medium size, splashed and washed with bright red on sunny side. Quality, above medium ; season, probably early winter.

No. 199—J. P. Cockburn, Gravenhurst, Ont.—Nora, medium size, oblong apple. Quality, above medium. Season, probably December to February.

No. 200—J. P. Cockburn, Gravenhurst, Ont.—Sally Brown, above medium size, oblate, splashed and streaked with red. Past condition for judging quality, Season, autumn.

No. 201—J. P. Cockburn, Gravenhurst, Ont.—Brydon Seedling ; medium sized, red, winter apple of medium quality.

No. 202—Wm. Spreadborough, Bracebridge, Ont.—Willen, a small, red winter apple of good quality. May prove valuable in the north.

SPRAYING.

As the advantages of spraying have been thoroughly proven and demonstrated by men who have been employed by the Government to do this work, and as the matter has been written about time and again in reports, bulletins, periodicals, newspapers, and spraying calendars, one might be led to think that all farmers and fruit growers would now spray their trees as a matter of course, just as they plough their fields. But this, unfortunately, is not the case, and there is still a large proportion of men engaged in fruit growing who do not spray. There is also another class of men who, knowing that spraying with Bordeaux mixture and Paris green will materially lessen the amount of scab and codling moth, do spray their trees, but are not satisfied with the results ; the reason of the poor success being, either that the mixture is not properly made, the trees are not sprayed thoroughly, or the spraying is not done at the proper time. Spraying is an expensive operation, and it is surprising that so many continue to waste hard-earned money by not doing the work properly. The early sprayings are the important ones, and these are too often neglected on account of press of other work, and when spraying is begun it is often too late to be of much service. A certain number of sprayings are suggested in the spraying calendars, and the times when they should be made. It should, however, be impressed on those who spray, that if heavy rain occurs before the mixture has dried on the trees, it will be washed off and the work must be done over again. The neglect of this is probably one of the chief causes of poor success in spraying. Spraying should be done thoroughly, and the underside of the leaves should receive as much of the spray as the upper sides. Every leaf or fruit missed means a foothold for disease or insect pests.

In preparing the mixtures and solutions, the formulæ given on the spraying calendars prepared by the Central Experimental Farm and similar institutions, should be followed as closely as possible. If a man knows the chemical composition of the materials he uses, and has made a special study of spraying, he may alter them slightly to meet certain circumstances, but if his knowledge of the materials used goes no further than the name, he should follow the instructions closely. He should also do his spraying at the seasons suggested. A delay of a few days may mean the loss of practically all the mixture or solution used without getting anything in return.

EXPERIMENTS WITH LIME MIXTURES FOR THE ERADICATION OF SCALE INSECTS.

During the winter of 1898-9, experiments were conducted at the Central Experimental Farm in the whitewashing of trees to retard the swelling of the buds in spring. Among the trees sprayed were some apple trees which were infested with the oyster-shell bark-louse. When the whitewash came off the trees during the summer it was found that they were practically free of that insect. The old scales had disappeared and scarcely any new ones could be found. The bark of the trees was much brighter and cleaner also than those which had not been sprayed. No notes had been taken as to how much the trees had been infested with the scales the previous autumn, but there was good evidence to show that they had been there. There had been 6 trees sprayed and they were all nearly equally clean. The formula used for the wash was lime, 60 pounds ; water, 24 gallons ; skim milk, 6 gallons. A thick mixture and one rather hard to get through the spray pump, but it made a good wash for the purpose it was intended, namely, to whiten the trees.

Although such good results had been obtained, it was not known at that time whether the strong mixture or the number of sprayings had most to do with the removal of the scales. The trees had been sprayed six times. If it were necessary to spray as often as that to rid the trees of the oyster-shell bark-louse it would not prove an economical practice. Experiments were therefore planned to discover, if possible, how many applications were necessary.

Following are the results obtained. The formula used was simply 2 pounds lime to 1 gallon of water. Notes were taken before spraying the trees as to how badly each tree was infested with the scales. The trees were sprayed on November 17, 20, 27, and December 7, 1899. The mixture did not stick nearly as well as when skim milk had been used the previous winter and was peeling off badly ten days after it was applied. The words 'slightly', 'considerably' and 'badly', indicate the degree of infestation, and while not exact, give an idea of the amount of scales on the trees. When only a few scales are said to be on the trees it means that the tree was practically rid of them and only an occasional scale could be found.

EXERIMENT MADE IN NOVEMBER AND DECEMBER, 1899.

Formula Used. Number of Trees Sprayed. Number of Times Sprayed.	How Infested before Spraying, November, 1899.	How Infested after Spraying, November, 1900.
2 lbs lime ; 1 gallon water.		
5 trees Sprayed twice	All considerably	Three with scarcely any scales left ; two slightly.
6 trees Sprayed three times	Four badly ; two considerably	Three with scarcely any scales left ; one slightly ; two considerably.
2 trees. Sprayed four times	One considerably ; one badly	Only a few scales left on both.

The results obtained in this experiment were very convincing. It was clearly proven that it was not necessary to add anything to the mixture for the purpose of making it stick better to the tree, as the loosening of the scales by the lime must have occurred within the first two weeks after the mixture was applied, as the wash was cracking off badly within ten days after the trees received the second application. It was also clearly shown by this experiment that two sprayings were quite sufficient to give satisfactory results.

EXPERIMENT MADE IN MARCH, 1900.

The experiment tried in the autumn of 1899 had afforded much proof that it was the caustic property of the lime which had been the means of loosening the scales and that there need not be many applications to get the results desired. From this evidence experiments were planned for the purpose of determining, if possible, the minimum strength of lime necessary to obtain satisfactory results and also to get further proof regarding the number of sprayings which it was necessary to make. Up to that period the time of the year at which it was best to do this work had not been given serious attention, as it was thought that any time when the trees were dormant would do.

The following table gives the various formulæ used, the dates of application and the results obtained. The sprayings were made during the month of March.

EXPERIMENT MADE IN MARCH, 1900.

Formula Used. Number of Times Sprayed.	How Infested before Spraying, March, 1900.	How Infested after Spraying, December, 1900.
1 lb. lime ; 1 gallon water.		
Sprayed twice....	Both considerably	One slightly ; only a few scales left on the other.
" three times.....	" "	Both slightly.
" Four times	" "	One still considerably ; only a few scales left on other.
1 lb lime ; 1 gallon water ; 1 quart. skim milk.		
Sprayed twice...	Both considerably	Both slightly.
" three times....	" "	One slightly ; only a few scales on other.
" four times.....	One badly ; one considerably....	One badly ; one considerably.
2 lbs. lime ; 1 gallon water.		
Sprayed twice.... ...	Both badly	Only a few scales left on each.
" three times. ..	"	Both considerably.
" four times.....	"	One Badly ; one considerably.
2 lbs. lime ; 1 gallon water ; 1 quart. skim milk.		
Sprayed twice..........	Considerably (one tree)..........	Considerably.
" three times ..	Both considerably	One slightly ; a few scales left on other.
" four times....	" "	One slightly ; one considerably
3 lbs. lime ; 1 gallon water.		
Sprayed twice.	Both badly	One slightly ; one badly.
" three times....	"	One badly ; a few scales left on other.
" four times.....	"	One slightly ; one considerably.
2 lbs. lime ; 1 gallon water ; 1 quart. skim milk ; 5 oz. salt.		
Sprayed twice....	Both badly.........	One slightly ; one considerably.
" three times.. .	"	One slightly ; a few scales left on other.
" four times.....	"	Both badly.

The results obtained from the experiments tried in March, 1900, are rather conflicting. One accurate conclusion, however, may be drawn, namely, that autumn, and not late winter or spring, is the best time to spray the trees for this purpose.

As large a proportion of scales appear to have been removed by the thinnest washes in this experiment as by the thickest. It would seem, from some of the results obtained, that the thicker and stickier mixtures had the effect of glueing the scales to the trees, thus counter-balancing in a greater or less degree the action of the lime in loosening them. In all cases, many scales were removed from the trees, but a few were so badly affected that they were still badly affected after being sprayed.

EXPERIMENT TO DETERMINE IF THERE WOULD BE ANY INJURY TO THE TREE FROM LIME IF APPLIED WHEN BUDS WERE BURSTING.

As it was not known whether the lime would have any injurious effects on the young growth of the trees (no injury having been observed when the trees were sprayed when dormant), the following experiment was made:—

An apple tree which was considerably infested with bark-louse, was chosen for this purpose. The formula used for the first spraying was 2 pounds lime, 1 gallon water, 1 quart skim-milk, 5 ounces salt; and for the second spraying the same, without the salt. At the time of the second spraying the leaf buds were bursting. The lime covered the young leaves, which were just showing, and no injury resulted. The tree bloomed freely, and there evidently had been no injury to the flower buds. The young lice began running at the usual time.

EXPERIMENT TO DETERMINE THE EFECT OF A LIME MIXTURE ON THE SAN JOSE AND NEW YORK SCALES.

An experiment was tried at Niagara in December, 1899, to determine if a lime mixture sprayed on peach trees would have any effect on the San José scale. Ten trees were used, all of which were more or less infested with it.

Three trees received one application ; two trees, two applications ; two trees, three applications; and three trees, four applications. The various sprayings were made between December 21, 1899, and January 4, 1900. The formula used was 60 pounds lime, 10 pounds salt, 6 gallons skim-milk, and from 28 to 30 gallons water. A very thick and strong mixture.

The trees were examined on June 21, 1900, but no injury to the scales could be detected.

Four plum trees which were infested with the New York scale were sprayed on December 21, 1899, with the same mixture. Two trees received one application and two, two applications. These trees were also examined on June 21, 1900, but the lime had evidently not had any effect on this insect either.

No injury was caused to either the plum or peach trees by the use of the lime mixture.

EXPERIMENTS IN PROGRESS.

Experiments are in progress this winter to determine, if possible, the most economical and satisfactory formula to use in spraying to eradicate the oyster-shell bark-louse.

HOW TO MAKE AND APPLY THE LIME MIXTURE.

Only good stone lime should be used. The lime is slaked in warm water, stirring it so that it will slake well, and the remainder of the water is then added, and the whole thoroughly stirred. It is then strained through a sieve having a mesh about one-twelfth inch in diameter, and is ready for use. A mild day should be chosen, so that the mixture may have a chance to flow about the scales without freezing. It is more satisfactory to apply the mixture while it is yet warm. A less strength than 2 pounds of lime to 1 gallon of water can be sprayed through a large barrel pump without danger of clogging, but if 2 pounds or more to 1 gallon is used it is necessary to use a smaller pump so that it may be cleaned easier should it clog.

CONCLUSIONS REACHED UP TO NOVEMBER 1900.

1. Lime slaked in water and sprayed on apple trees infested with the oyster-shell bark-louse has the effect of loosening the scales.

2. The scales, when loosened, are removed from the trees by rain, ice, wind, and probably by other means.

3. As the scales contain the eggs from which the young insects hatch about June 1, it is necessary, in order to get the best results, that the trees be sprayed as soon as possible after the leaves fall in autumn, so that the loosened scales may be exposed to the weather for a long time before the eggs hatch.

4. The lime appears to have no injurious effect on the eggs within the scales.

5. Lime used in various proportions in the several experiments had no apparent injurious effects on apple or peach trees. Even when the leaf buds were opening no injury occurred.

6. As the action of the lime seems to occur soon after the trees are sprayed, it is not necessary to use any substance other than water to help bind it to the tree. On the contrary, it would appear that such substances counterbalance the effects of the lime, for a time, by glueing the scales to the trees.

7. It is important to use good stone lime, which has not been air-slaked.

8. As no experiments were conducted in the autumn of 1899, to determine what proportion of lime was necessary to get satisfactory results, and as it has been found that spraying in late winter or early spring is not a very good time, it is not possible yet to say what is the most economical formula to use. As nearly all the scales were removed from some of the trees, which were sprayed with 1 pound lime to 1 gallon water in March, 1900, it is quite likely that satisfactory results will be obtained by using that mixture in the autumn.

9. It is necessary to make at least two applications, as those scales with which the mixture does not come in contact will not be effected by it, and it is not possible to do the work thoroughly with one spraying.

10. The lime mixture applied in winter evidently has no effect on the San José or New York scales.

11. The bark of trees sprayed with the lime mixture is much brighter afterwards than on trees not sprayed, and it is possible that many fungus germs are destroyed.

COVER CROPS.

The importance of cultivating orchards has for ten years or more been impressed upon fruit growers in America, on every possible occasion. It has been found, however, after several years' experience that the constant stirring of the soil lessens the amount of humus in it to such an extent that in districts where droughts occur frequently it becomes a burning question how to restore humus cheaply to the soil ; for as soil with plenty of humus holds moisture better than soil with little of it, the amount of moisture conserved by cultivation is becoming less every year where humus is not restored. Of late years there have been some severe winters, when fruit trees were root-killed by the thousands, and thus another question arose as to how best to protect the roots of the trees sufficiently to save them. Thus developed the value of the so-called 'cover crop,' which, although it had been grown by many fruit growers for years back, did not become a prominent feature in Canadian horticulture until the last six or seven years.

At the Central Experimental Farm the importance of cover crops has been fully recognized, and experiments have been conducted with them since 1895, and in the horticulturist's reports for 1896, 1897, 1898 and 1899, the experience which had been obtained concerning the different plants used for this purpose, and other matters concerning them, was published.

The best time to sow seed for a cover crop is sometime in the month of July, preferably about the middle, as the growth of the fruit trees is well advanced by that time, and the fruit itself well developed. The seed should be sown, if possible, when the ground is moist, as at that time of year it will germinate quickly if there is moisture. At the Central Experimental Farm it has been found that Common Red clover or Mammoth Red clover, sown broadcast at the rate of 12 pounds per acre, gives the best results, although on light soil, Lucerne, sown at the rate of 15 pounds per acre, will grow taller by autumn and hold the snow better. After the seed is sown the land should be rolled, as this will bring the moisture to the surface and about the seed and hasten germination. It is important to get growth started in good time, as there is often protracted drought in July and August which prevents germination and spoils the prospect for a good cover crop. Buckwheat and rye also make good cover crops, but the advantage of using clovers is that they are what are known as leguminous plants, and these assimilate nitrogen from the air through the nodules on their roots ; thus, by using this class of plants, nitrogen, the most expensive plant food, may be had for the price of the seed. The Hairy Vetch (*Vicia villosa*) has given good satisfaction where it has been tested. In dry districts where it is difficult to get a catch of clover, this is likely to prove very valuable. It grows until late in the autumn, as it takes a severe frost to kill it. It also belongs to the leguminous class of plants. It has not proved hardy at Ottawa, though as yet only tested in small plots.

In the spring the clover may be let grow until there is a good crop to plough under, but in those districts where drought is likely to occur in the summer, it is much better to plough the land as soon as it can be worked, without waiting for any new growth. The following figures, taken from Bulletin 164, of the Michigan Experiment Station, show how much moisture may be saved by ploughing early :—

'Two tests were made in Field No. 6. The ploughing was done May 2. Samples were taken for determination of moisture on May 10 and 17, with the following results :—

May 10.	1st Foot.	2nd Foot.	3rd Foot.	Average 3 ft.
	Per cent.	Per cent.	Per cent.	Per cent.
Spring ploughed	10·50	10·07	8·04	9·54
Not ploughed	10·10	8·12	7·26	8·49
	·40	1·95	·78	1·05
May 17.				
Spring ploughed	9·33	6·75	6·97	7·68
Not ploughed	8·78	5·92	6·82	7·17
	·55	·83	·15	·51

'This gives a difference in the first instance of 2·8 pounds per square foot to a depth of 3 feet, and of 1·4 pounds in the second instance, in favour of the land ploughed early in the spring.

'Experiments tried by Professor King, and reported in the Wisconsin Report for 1891, pages 101 and 102, show larger differences. The ploughing was done on April 29 and samples taken on May 6, showing a difference for the upper 3 feet of 7·02 pounds of water per square foot. On another plot the observed difference of the samples taken on May 14 to the same depth was 4·65 pounds.

These determinations all show that to have as large a supply of moisture as possible for the crop it is necessary to plough or work the soil in some way to form a mulch to prevent evaporation as early in the spring as the condition of the land will allow.

The advantages, then, of a cover crop are, first, that the mass of foliage and stems which it produces helps to prevent the frost from going deep into the soil, and also prevents, to a large extent, that thawing and freezing of the soil in the spring which is so harmful to the roots of trees.

2nd. The cover crop helps to prevent the snow from blowing away, and thus a thicker covering is formed for the protection of the roots of the trees.

3rd. Humus is added to the soil by ploughing it under, thus increasing its water-holding capacity and fertility.

4th. Nitrogen is added to the soil without other expense than the price of the seed.

5th. A cover crop growing in the orchard in autumn will utilize plant food, which has been made available during the summer, and thus prevent it from leaching away. It thus becomes a 'catch crop' as well.

LIST OF BEST VEGETABLES FOR FARMERS.

As all the experiments which are conducted with vegetables cannot be published every year on account of want of space, a list of the varieties of all the principal kinds which have proved the most satisfactory after several years' tests was published in the report for 1899 under the heading 'List of best Vegetables for Farmers.' This gave in a concise form much valuable information as to the best varieties to plant and must have proved very helpful to those who studied it. As the annual reports are very liable to be mislaid during the year, and as one is apt to forget the name of a variety, it has been thought advisable to again publish this list with what changes another year's experience warrants making.

Asparagus.—Connover's Colossal is the best all-round variety.

Beans.—Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee, for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Southern Crease-back and Asparagus (early) and Golden Andalusia (late) are the best pole varieties.

Beets.—Egyptian Turnip, Eclipse and Bastian's Blood Turnip are three of the best varieties.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium); Late Flat Dutch, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage.

Cauliflowers.—Extra Early Dwarf Erfurt and Early Snowball (early); Kronk's Perfection (medium) and Large Late Algiers are among the best.

Carrots.—Chantenay and Guerande or Oxheart are two of the best carrots, but if a good extra early sort is required, the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching, Paris Golden Yellow, Improved White Plume, White Walnut (early); London Red, Perfection Heartwell, White Triumph (late) are among the best.

Corn.—Early White Cory, Crosby's Early, Henderson's Metropolitan (early); Perry's Hybrid, Stabler's Early, Early Evergreen (medium); Stowell's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably, and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plants.—New York Improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, New York (curled), Tennis Ball, Salamander and Golden Queen (cabbage); Trianon and Paris Cos lettuce make a good list.

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type, and Surprise, Bayview, Paul Rose and Emerald Gem, of the other types, are all good.

Melons, Water.—Cole's Early, New Imperial, Ice Cream, and Phinney's Early are early water melons of excellent quality.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Double Curled is as good as any.

Peppers.—Cayenne, Cardinal, Squash and Golden Dawn are four of the best.

Pease.—Gregory's Surprise, Gradus, Nott's Excelsior and Premium Gem (early); McLean's Advancer, Improved Stratagem and Heroine (medium). None of these are tall growing varieties. Juno (dwarf), Telephone, Veitch's Perfection (tall), (late). Nott's New Perfection is a promising second early sort, and Dwarf Telephone and Startler two promising late varieties.

Potatoes.—Extra Early: Early Ohio and Early Andes (pink), Bovee and Burpee's Extra Early (pink and white). Early: Everett and Rochester Rose (pink), Early Puritan (white). Medium: Carman No. 1 (white), Empire State (white). Late: Late Puritan (white), American Wonder (white), Rural Blush (pink).

Radishes.—Early: Rosy Gem, French Breakfast, Red Rocket (red) and Icicle (white). Late: White Strasburg, Long White Vienna. Winter: Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnæus and Victoria are the most satisfactory.

Salsify.—Long White is the best.

Spinach.—Victoria and Thick-leaved are the best.

Squash.—Early: White Bush Scalloped and Sumer Crook Neck. Late: Hubbard.

Tomatoes.—Early: Conqueror, Dwarf Champion, Canada Victor and Early Ruby. Main Crop: Brinton's Best, Livingston's Favourite, Matchless, and Baltimore Prize Taker.

There are many varieties of this vegetable which are almost equal in excellence and productiveness. Spark's Earliana is a promising early sort tested this year.

Turnips.—Early: Extra Early Milan and Red Top Strap Leaf. Swedes: Champion Purple Top, Skirving's Improved.

EXPERIMENTS WITH POTATOES.

This was a very good season for potatoes, and the yields were high in consequence. There was just enough rainfall to keep the ground moist all summer without it becoming too wet, and the vines made rapid and vigorous growth. There was no blight, and the potatoes appeared to ripen quite naturally.

There were 117 varieties tested at the Central Farm this year, of which the Sabean's Elephant, a comparatively new sort, gave the best crop, the yield being at the rate of 589 bushels 36 pounds per acre. The poorest yield was 209 bushels per acre, the difference in yield between the best and poorest being 380 bushels 36 pounds per acre. The average yield per acre from all the varieties tested was 417 bushels 37 pounds, being about two and three-fourths times as much as the average of Ontario this year.

If, however, these varieties had been grown by the acre instead of in small plots the yields would not have been so large, but as the poorest yielder gave about one and three-fourths times as much per acre as the average for Ontario, something must be wrong with the system of cultivating potatoes, generally adopted, or with the varieties planted.

The soil in which the potatoes were grown this year was a sandy loam, where a strawberry plantation had been the previous season. In the autumn of 1899, after the strawberry plants had been ploughed under, fall rye was sown on September 15, at the rate of two bushels per acre. On May 18, 1900, the rye was ploughed under. The land was then disc harrowed, and harrowed twice with the smoothing harrow. Drills were made about four or five inches deep and 2½ feet apart, and the sets, which were of about the same size, and with at least three eyes and a good amount of flesh, were dropped 1 foot apart, each variety occupying one row 66 feet long. The potatoes were covered with the hand hoe to get as uniform conditions as possible. The soil was harrowed once before the potatoes were up to kill any weeds which had germinated and to level the ground. The surface soil between the rows was kept loose by the cultivator until the vines met, but the latter were not hilled up, level culture being adopted. The vines were sprayed with Paris green and Bordeaux mixture to destroy the potato beetle and prevent blight. The potatoes were planted on May 25 and 26, and dug on October 9, 10 and 11.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Sabean's Elephant	Good	589	36	528	..	61	36	White.
Vanier	Poor to med.	576	24	523	36	52	48	Red.
Enormous	Good	561	..	499	24	61	36	White.
Canadian Beauty	"	547	48	490	36	57	12	Pink and white.
Irish Cobbler	"	532	24	484	..	48	24	White.
Early Sunrise	"	532	24	473	..	59	24	Pink.
Burnaby Mammoth	"	530	12	453	12	77	..	Pink and white.
Rose No. 9	Medium	528	..	484	..	44	..	Pink.
Northern Spy	Poor	525	48	492	48	33	..	Bright pink.
Flemish Beauty Seedling	"	525	48	473	..	52	48	"
Burnaby Seedling	Good	525	48	464	12	61	36	Pink and white.
Empire State	"	519	12	466	24	52	48	White.
Money Maker	"	517	..	466	24	50	36	"
General Gordon	"	517	..	459	48	57	12	Pink.
Polaris	"	502	42	448	48	53	54	White.
Late Puritan	"	492	48	420	12	72	36	"
Seattle	Medium	490	36	444	24	46	12	"
American Wonder	Good	488	24	457	36	30	48	"
Rural No. 2	"	488	24	453	12	35	12	"
Swiss Snowflake	"	486	12	431	12	55	..	"
Peachblow	....	481	48	426	48	55	..	"
State of Maine	Good	481	48	424	36	57	12	"
Vick's Extra Early	"	481	48	404	48	77	..	Pink and white.
Rose of the North	....	479	36	396	..	83	36	Pink.
Rawdon Rose	Good	477	24	404	48	72	36	Pink and white.
New Queen	"	475	12	426	48	48	24	" "
Sharpe's Seedling	"	475	12	398	12	77	..	" "
Rochester Rose	"	470	48	413	36	57	12	Pink.
Early St. George	"	468	36	409	12	59	24	Pink and white.
American Giant	Medium	464	12	422	24	41	48	White.
Seedling No. 230	"	464	12	387	12	77	..	"
Early Market	....	462	..	440	..	22	..	Pink.
Early Norther	Medium	462	..	409	12	52	48	"
Rural Blush	Good	459	48	435	36	24	12	"
N. Bergeron	....	457	36	444	24	13	12	White, pink eye.
Dreer's Standard	Good	457	36	435	36	22	..	White.
Maule's Thoroughbred	....	457	36	426	48	30	48	Pink.
Brown's Rot Proof	Medium	455	24	440	..	15	24	"
Reeves Rose	....	455	24	387	12	68	12	"
I. X. L	Good	451	..	396	..	55	..	Pink and white.
Jubilee	"	451	..	418	..	33	..	" "
White Elephant	....	446	36	415	48	30	48	" "
Columbus	....	446	36	411	24	35	12	" "
Penn Manor	....	446	36	378	24	68	12	" "
Napoleon	Good	446	36	369	36	77	..	Pink.
Vigorosa	....	444	24	374	..	70	24	Pink and white.
From A. S. Brosseau	....	442	12	426	48	15	24	Red and white.
Holborn Abundance	Medium	442	12	413	36	28	36	White.
Clay Rose	"	440	..	400	24	39	36	Pink.
Lee's Favourite	Good	437	48	363	..	74	48	"
Troy Seedling	Medium	437	48	360	48	77	..	White.
Uncle Sam	....	435	36	418	..	17	36	"
Burbank's Seedling	Good	435	36	409	12	26	24	"
Country Gentleman	....	435	36	316	48	118	48	Pink and white.
Pearce	....	433	24	374	..	59	24	" "
Early Pride	....	426	48	385	..	41	48	Pink.
Carman No. 3	Good	424	36	407	..	17	36	White.
Early Six Weeks	"	424	36	391	36	33	..	Pink.
Early Harvest	"	422	24	365	12	57	12	"
Cambridge Russet	"	420	12	404	48	15	24	White.
Wonder of the World	"	420	12	387	12	33	..	Pink and white.
Green Mountain	"	420	12	385	..	35	12	White.
Thorburn	"	420	12	358	36	61	36	Pink and white.
Mill's Prize	....	420	12	343	12	77	..	White.

POTATOES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Burpee's Extra Early	Good	418	..	352	..	66	..	Pink and white.
Early Rose	"	415	48	367	24	48	24	Pink.
White Giant	..	407	..	382	48	24	12	White.
Sir Walter Raleigh		404	48	365	12	39	36	"
Champion		402	36	360	48	41	48	"
Everett	Good	402	36	345	24	57	12	Pink.
Great Divide	"	400	24	387	12	13	12	White.
Doherty's Seedling		400	24	356	24	44	..	"
Delaware	Good	400	24	321	12	79	12	"
Dakota Red	Medium	400	24	338	48	61	36	Red.
Early Puritan	Good	400	24	332	12	68	12	White.
Daisy	"	391	36	343	12	48	24	Pink and white.
Lizzie's Pride	"	389	24	325	36	63	48	Pink, red eye.
Early White Prize	"	385	..	369	36	15	24	White.
Bovee	"	385	..	325	36	59	24	Pink and white.
20th Century		382	48	330	..	52	48	White.
Carman No. 1	Good	380	36	352	..	28	36	"
McIntyre		380	36	352	..	28	36	" and purple.
Pearce's Extra Early	Good	378	24	363	36	14	48	Pink.
Early Andes	"	376	12	349	48	26	24	"
Seneca Queen	Very good	376	12	343	12	33	..	Pink & white with bright pink eye.
Harvest King		374	..	343	12	30	48	White.
Gem of Aroostook	Good	374	..	338	48	35	12	Pink and white.
Quaker City		374	..	334	24	39	36	White.
New Variety No. 1	Poor	374	..	299	12	74	48	"
White Beauty	Good	374	..	297	..	77	..	"
Irish Daisy	"	374	..	294	48	79	12	"
Prolific Rose		371	48	341	..	30	48	Pink.
Chicago Market	Good	369	36	341	..	28	36	"
Dark Red Seedling		367	24	341	..	26	24	Deep pink.
Pearce's Prize Winner	Good	367	24	294	48	72	36	Pink.
Rose of Erin		365	12	330	..	35	12	Pale pink, bright pink eye.
Early Ohio	Good	363	..	321	12	41	48	Pink.
Prize Taker	"	356	24	261	48	94	36	"
Livingston		354	12	314	36	39	36	White, pink eye.
Beauty of Hebron	Medium	347	36	277	12	70	24	Pink and white.
Light Red Seedling		341	..	310	12	30	48	Pink.
Livingston's Banner	Good	338	48	308	..	30	48	White.
Maggie Murphy	Medium	334	24	325	36	8	48	Bright pink.
Early Dawn		322	..	299	12	22	48	Pink, brighter at seed end.
Clarke's No. 1	Good	321	12	277	12	44	..	Pink.
Seedling No. 7	Medium	319	..	277	12	41	48	Bright pink.
Earliest of All	Good	319	..	250	48	68	12	Pink and white.
Early Michigan		310	12	259	36	50	36	
Hale's Champion	Poor	290	24	209	..	81	24	White.
Houlton Rose		272	48	206	48	66	..	Pink.
Brownell's Winner	Good	266	12	217	48	48	24	Red.
Pink Eye		255	12	220	..	35	12	
Reading Giant	Poor	244	12	220	..	24	12	Pink.
Ohio Junior		237	36	213	24	24	12	"
Seedling No. 214	Good	239	48	222	12	17	36	White.
Bill Nye		217	48	167	12	50	36	"
Pride of the Market	Good	209	..	154	..	55	..	"

TWELVE BEST YIELDING VARIETIES OF POTATOES—AVERAGE OF SIX YEARS' TESTS.

Name of Variety.	Average yield per acre.		Name of Variety.	Average yield per acre.	
	Bush.	lbs.		Bush.	lbs.
1 Holborn Abundance	419	28	7 Burnaby Seedling	365	30
2 American Wonder	411	56	8 Vanier	362	49
3 Seedling No. 230	392	41	9 State of Maine	362	32
4 Late Puritan	389	43	10 Seattle	362	8
5 Empire State	378	17	11 Polaris	360	49
6 Everett	371	3	12 Early Norther	358	56

POTATOES—PLANTING AT DIFFERENT DISTANCES APART.

During the past five years an experiment has been tried in planting the sets at different distances apart in the rows; the rows in each case being 2½ feet apart. The best results have been obtained so far by planting the sets 12 inches apart, although it will require a few years yet before accurate conclusions can be drawn. There was very little difference in the proportion of marketable and unmarketable tubers in this experiment. In former years only one variety was used in this test, but this year two were planted; the Early Andes, an early variety, and the Uncle Sam, a comparatively late one. The average results from these two varieties are given as the yields per acre for 1900.

Distance apart of Sets.	Seed required per acre.		Yield per acre, 1896.		Yield per acre, 1897.		Yield per acre, 1898.		Yield per acre, 1899.		Yield per acre, 1900.		Average yield per acre, 5 years.		Average yield per acre after deducting seed.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
10 inches apart	34	50	355	18	331		268	24	392	2	327	48	334	54	300	4
12 "	29	2	336	36	278	47	347	36	406	34	316	48	337	16	308	14
14 "	24	53	323	24	268	50	290	24	454	58	325	36	332	38	307	45
16 "	21	46	335	30	226	1	233	12	392	3	279	24	293	14	271	28
18 "	19	21	289	18	226	31	253		234	34	270	36	254	48	235	27

POTATOES—PLANTING AT DIFFERENT DEPTHS.

An experiment has been conducted during the past three years in planting potatoes at different depths in rows 2½ feet apart and 12 inches apart in the rows. The sets had at least three eyes each, and were about uniform in size. The soil was sandy loam, both years. Level cultivation was adopted, and thus very little soil was thrown on the potatoes after they were covered at the time of planting. The following table shows that the best yields were obtained from planting the sets only 1 inch deep. As the relative yields from the different depths of planting have not been the same in both years, it will be necessary to continue this test for some time before accurate conclusions can be drawn. Notes were taken on the depths at which tubers were formed in 1899 and 1900, and it was found that most of them were within 4 inches of the surface of the soil, even where the set had been planted 6, 7 and 8 inches deep. Where the sets were planted less than 4 inches deep nearly all the tubers were formed between that and the surface of the soil. Two varieties, the Sir Walter Raleigh and Empire State, were used in the test this year, and the average results from them are given as the yields for 1900. There are several reasons why the potatoes planted from one to three inches deep should give the best results. Potatoes will develop more rapidly in warm soil than in that which is cooler. The soil within the first three or four inches of the surface is warmer than that three or four inches lower down, hence the conditions are more favourable for the potato. The tubers when the potato is in the wild state develop near the surface or on the surface of the ground. It seems natural, therefore, that the cultivated potato should be planted shallow.

On the other hand, much of the success of shallow planting will depend on the moisture of the soil. If the season is very dry the first two inches of soil may be so dry that the potato will not take root readily, and the season of growth will thus be shortened, but this has not happened here during the past three years. Once the roots begin to grow they speedily reach a depth where plenty of moisture is found.

From the results obtained it seems reasonable to conclude that where the soil is not dry the best results can be obtained from shallow planting. In any case, early planted potatoes will probably succeed best when planted shallow, as the ground will be warmer. In places where the spring is late or where the ground is cold, best results will probably be had by shallow planting.

Although the best results have been obtained in sandy loam soil by planting the sets one inch deep, this method is not recommended for field culture. Unless the surface of the soil is kept loose and free from weeds the potato crop will not be large. In order to kill a large proportion of the weeds which grow, the ground should be harrowed once or twice before the potatoes come up or just as they are coming up. If the sets were planted only one inch deep and the soil harrowed, many of them would be dragged out, hence about four inches deep would be the best.

Depth of Planting.	Yield per acre, 1898.		Yield per acre, 1899.		Yield per acre, 1900.		Average Yield per acre, 1898–1900.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
1 inch	347	36	532	24	468	36	449	32
2 inches	*244	12	469	28	462		358	33
3 "	281	36	493	41	422	24	399	13
4 "	277	12	520	18	404	48	400	46
5 "	290	24	474	19	334	24	366	12
6 "	264		421	5	367	24	350	49
7 "	290	24	392	3	336	36	339	40
8 "	266	12	353	19	345	24	321	38

POTATOES PLANTED AT DIFFERENT DATES.

In 1898 an experiment was begun in planting potatoes at different dates, beginning when the main crop was put in and continuing at intervals of two weeks until August 23, 1898, July 23, 1899, and July 21, 1900. An early and a late variety were used in each case, the varieties being Early Norther and Irish Daisy, in 1898, Early Norther and Rural Blush, in 1899, and Early Norther and Sir Walter Raleigh, in 1900.

In 1898 and 1899 the decrease after the third planting was so great that it appeared as if a fair crop of marketable potatoes could not be produced when the seed was planted much after June 24, but the results obtained in 1900 by planting on July 7, go to show that it is possible to produce a good crop of potatoes after a crop of early vegetables, such as pease, has been removed. The yield of marketable potatoes planted from seed of Early Norther, planted on July 7, was at the rate of 224 bushels. 24 pounds to the acre.

This experiment will be continued for several years yet.

*Note.—This great decrease in yield was probably due to a variation in the soil which it is sometimes difficult to avoid.

Date of Planting.	Total Yield per Acre, 1898.		Total Yield per Acre, 1899.		Total Yield per Acre, 1900.		Yield per Acre Marketable, 1900.		Yield per Acre Unmarketable, 1900.		Average Total Yield per Acre, 1898-1900.		Average Yield per Acre Marketable, 1898-1900.		Average Yield per Acre Unmarketable, 1898-1900.	
Early Variety.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1st planting, May 26, 1898; May 26, 1899; May 26, 1900	277	12	505	47	409	12	374	..	35	12	397	24	344	58	52	26
2nd planting, June 10, 1898; June 9, 1899; June 9, 1900	160	36	459	48	453	12	360	48	92	24	357	52	289	22	68	30
3rd planting, June 24, 1898; June 23, 1899; June 23, 1900	125	24	237	10	365	12	303	36	61	36	242	35	193	54	48	41
4th planting, July 8, 1898; July 7, 1899; July 7, 1900	30	48	9	41	268	24	224	24	44	..	102	58	74	48	28	10
5th planting, July 23, 1898; July 21, 1899; July 21, 1900	1	6	....		26	24	....		26	24	9	10	....		....	
6th planting, August 9, 1898	....		....		....		....		....		....		....		....	
7th " " 23, 1898	....		....		....		....		....		....		....		....	
Late Variety.																
Planted on same dates as the early variety—																
1st planting	259	36	338	48	277	12	259	36	17	36	291	52	239	22	52	30
2nd "	173	48	164	34	338	48	277	12	61	36	225	43	162	22	63	21
3rd "	68	12	157	18	198	..	167	12	30	48	141	10	115	32	25	38
4th "	8	48	19	22	202	24	145	12	57	12	76	51	48	24	28	27
5th "	1	6	....		26	24	....		26	24	9	10	....		9	10
6th "	....		....		....		....		....		....		....		....	
7th "	....		....		....		....		....		....		....		....	

POTATOES—RECEIVED FOR TEST IN 1900.

Every year samples of potatoes are received for test which are either seedlings, not yet named, new named varieties, or varieties for identification. As the quantity received of each of these is usually smaller than that used in the uniform test plots, the comparison of yields between these and the named varieties would not be very conclusive. For this reason, the results from the samples this year are put in the following table :—

Name of Variety and Address of Sender.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Rock from Jas. Carruthers, Magundy, N.B.	16	642	24	580	48	61	36
From Geo. Pyke, Wolf Island, Ont	66	563	12	532	24	30	48
Early Elkinah, S. Wile, Branch La Have, N.S	16	545	36	528	..	17	36
Churchill Seedling	66	525	48	492	48	33	.
Early Summer, R. A. Snason, Uxbridge, Ont	33	514	48	440	..	74	48
Montana Bluff, Jas. Lamb, Walkerton, Ont	33	510	24	466	24	44	..
Dobson's Early, " "	33	497	12	453	12	14	..
Mammoth Pearl, " "	33	440	..	422	24	17	36
Wall's Orange, " "	33	422	24	396	..	26	24
Silver Dollar	16	360	48	352	..	8	48
California Cup, Jas. Lamb, Walkerton, Ont	16	264		228	48	35	12
Dutch, Blue, A. Ferguson, Port Morien, N.S	33	211	12	176	..	35	12

EXPERIMENTS WITH TOMATOES.

There were 167 varieties of tomatoes tested this year. A large number of these are probably synonyms, but seed under that number of names was offered for sale by Canadian and American seedsmen this year. Many of the varieties have now been tested five years, and it is proposed to discontinue growing all those which have not proved to be among the best.

The yields of the twenty-five best yielding varieties, only, are published, as space will not permit of a full table being given. In addition to this list, however, will be found the names of the six earliest varieties for this year, also the six wrinkled and twelve smooth varieties which have averaged the best yields in five years.

The seed of the tomatoes grown this year was sown in hot-beds on April 6; the young plants were pricked out into strawberry boxes on April 30, and planted in the open ground on June 7. They were placed four feet apart each way, and five plants of each variety were used. The soil was a light, sandy loam on which tobacco, which had been well manured, was grown the previous year. The soil was kept cultivated until the growth of the plants prevented it. The vines were not trained in any way, but were allowed to lie on the ground. Owing to the moist season, the crop was not nearly as good as usual.

TOMATOES—TEST OF VARIETIES.

Name of Variety.	Seedsman.	Date of First Ripe Fruit.	Yield of Ripe Fruit. — First two pickings		Yield of Ripe Fruit. — Balance of pickings		Total Yield of Ripe Fruit. — All pickings		Remarks.
			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Bond's Early Minnesota.	Gregory...	Aug. 6	22	..	53	4	75	4	Medium size, regular, smooth, purple.
Key's Prolific...........	Vick.....	" 20	1	12	71	12	73	8	Small, scarlet, somewhat pear shaped.
Alpha	Gregory...	" 18	11	6	60	..	71	6	Medium size, wrinkled, scarlet.
Baltimore Prize Taker ..	Landreth..	" 9	13	2	54	14	68	..	Medium size, regular, smooth, purple.
Boston Market..........	Farquehar	" 17	4	11	59	..	63	11	Medium size, regular, smooth, scarlet.
Bright and Early.......	Vick......	" 13	23	10	39	..	62	10	Below medium size, regular, smooth, scarlet.
Liberty Bell............	Johnson & Stoke.	" 15	..	..	62	8	62	8	Above medium, regular, smooth, scarlet.
Essex Hybrid...........	Henders'n	" 20	..	15	61	..	61	15	Above medium size, regular, smooth, purple.
Nicholson's Early F'rcing	Farquehar	" 18	..	3	60	8	60	11	Below medium size, slightly wrinkled, scarlet.
Canada Victor..........	Graham...	" 15	7	7	51	8	58	15	Medium size, smooth, scarlet.
Acme	" ...	" 15	7	12	50	..	57	12	Medium size, regular, smooth, purple.
Mayflower..............	Steele.....	" 20	1	2	56	4	57	6	Medium size, regular, smooth, scarlet.
Waldorf................	Thorburn.	" 18	4	8	52	8	57	..	Medium size, regular, smooth, purple.
King Humbert..........	Dreer	" 7	1	10	54	12	56	6	Below medium, irregular, wrinkled, scarlet.
Autocrat..............	Thorburn.	" 20	1	14	54	4	56	2	Medium size, regular, smooth, purple.
Volunteer	Graham...	" 18	..	15	54	15	55	14	Medium size, regular, smooth, scarlet.
Large Red Perfection...	Thorburn.	" 20	1	9	54	4	55	13	Above medium size, regular, smooth, scarlet.
Maule's Earliest	Maule....	" 4	2	11	53	..	55	11	Medium size, regular, slightly wrinkled, scarlet.
Burpee's Combination...	Burpee. ..	" 20	..	10	55	..	55	10	Above medium, regular, smooth, scarlet.
Horsford's Prelude......	Thorburn.	" 15	2	6	52	12	55	2	Small, regular, smooth, scarlet.
Best of All.............	Graham...	" 13	6	6	48	4	54	10	Medium size, regular, smooth, scarlet.
Early Bermuda.........	Landreth.	" 14	16	7	37	12	54	3	Medium size, regular, wrinkled, scarlet.
Thorburn's Long Keeper.	Thorburn.	" 20	..	5	53	4	53	9	Below medium, regular, smooth, purple.
Burpee's Climax	Burpee. ..	" 9	11	8	41	8	53	.	Medium size, regular, smooth, purple.
Matchless	Steele.....	" 16	..	..	52	4	52	4	Large, regular, smooth, scarlet.

SIX EARLIEST VARIETIES.

Name of Variety.	Seedsman.	Date of First Ripe Fruit.	Yield of Ripe Fruit. — First two pickings		Yield of Ripe Fruit. — Balance of pickings		Total Yield of Ripe Fruit. — All pickings		Remarks.
			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Early Ruby.............	Steele.....	Aug. 2	2	14	47	8	50	6	Medium size, regular, smooth, scarlet.
Spark's Earliana........	Johnson & Stoke.	July 28	18	14	28	4	47	2	Medium size, slightly wrinkled, scarlet.
Dominion Day..........	Bruce	Aug. 2	12	12	30	4	43	..	Above medium, wrinkled, scarlet.
Quicksure.............	Johnson & Stoke.	July 28	15	4	19	8	34	12	Medium size, regular, smooth, scarlet.
Early Leader...........	Vick......	" 28	4	8	26	..	30	8	Medium size, wrinkled, scarlet.
Terrill's Early	Terrill....	Aug. 4	7	11	22	12	30	7	Medium size, regular, smooth, scarlet.

SIX BEST YIELDING WRINKLED VARIETIES—AVERAGE FOR FIVE YEARS.

Name of Variety.	Average date of First Ripe Fruit.	Average Yield per Plant.		Remarks.
		Lbs.	Oz.	
Early Bermuda	Aug. 7....	16	7	Medium size, regular, wrinkled, scarlet.
Money Maker	" 4....	15	4	" "
Extra Early Jersey	" 4....	14	5	" "
Early Richmond............	" 5....	14	1	Medium size, irregular, wrinkled, scarlet.
Democrat	" 5....	13	4	Medium size, somewhat wrinkled, regular, purple.
Conqueror...	" 2....	13	2	Medium size, moderately regular, wrinkled, scarlet.

TWELVE BEST YIELDING SMOOTH VARIETIES—AVERAGE FOR FIVE YEARS.

Canada Victor...............	Aug. 3....	15	1	Medium size, smooth, scarlet.
Baltimore Prize Taker	" 6...	14	11	Medium, size, regular, smooth, purple.
Bond's Early Minnesota.....	July 31....	14	9	" "
Brinton's Best	Aug. 12....	14	6	Large, regular, smooth, scarlet.
Comrade	" 6....	14	6	Medium size, smooth, scarlet.
Early Ruby	July 31....	13	15	Medium size, regular, smooth, scarlet.
Mayflower...................	Aug. 6....	13	12	Large, regular, smooth, scarlet.
Extra Early Advance	" 4....	13	12	Below medium size, regular, smooth, scarlet.
Horsford's Prelude...	" 5....	13	12	Small, regular, smooth, scarlet.
Essex Hybrid	" 6....	13	11	Above medium size, regular, smooth, purple.
Atlantic Prize	" 4....	12	15	Medium size, smooth, regular, scarlet.
Autocrat	....	12	11	Medium size, regular, smooth, purple.

EXPERIMENTS WITH CORN.

Corn is such a popular vegetable that the varieties offered for sale by the seedsmen are being well tested. Last year, a list was published giving the results obtained from seventy-six varieties which were grown. This year seventy-two varieties were tested. In the following table will be found much data regarding the different sorts, there being recorded the name of the seedsman from whom the seed was obtained, the kind of corn, the date when it was fit for use in 1899 and 1900 ; the height in 1900 ; the average length of ears for 1899 and 1900, and the average yield for 1899 and 1900.

The soil in which the corn was grown this year was a light sandy loam on which tobacco, which was manured well, had been grown last year. It was ploughed in the spring, disc-harrowed and harrowed twice with the smoothing harrow. The corn was planted on May 26, in hills three feet apart each way, the places having been previously marked by a corn-marker. About six kernels were planted in a hill. After germination had taken place and danger from cut-worms was over, the number of plants in a hill was reduced to four. Twelve hills of each variety were used for comparison. The corn was kept thoroughly cultivated during the summer, and when growth had ceased in the autumn it was cut and the ears removed and counted.

Owing to part of the soil being somewhat colder than the other, some varieties which were among the earliest to be fit for use in 1899 were later this year. On this account, the arrangement of early, second early, intermediate, and late sorts in the table was not changed and is the same as in 1899.

EARLY VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900.		Length of ears, 1899.	Length of ears, 1900.	Average length of ears for two years.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
					ft.	in.	in.	in.	in.			
Extra Early Beverly	Landreth	Hybrid	Aug. 12.	Aug. 9.	6	2	7	6	6½	31	51	41
Extra Early Cory	Steele	Sweet	" 15.	" 11.	5	0	6½	5½	6	60	53	56
Mitchell's Extra Early	Darch and Hunter	Flint	" 15.	" 13.	5	6	8	6½	7¼	59	49	54
Early Marblehead	Steele	Sweet	" 15.	" 12.	6	3	7	6	6½	52	48	50
Telephone Sweet	Salzer	"	" 15.	" 10.	5	6	6	6	6	49	45	47
Early Cory	Bruce	"	" 15.	" 11.	5	11	7	6	6½	42	48	45
Mammoth White Cory	Gregory	"	" 15.	" 10.	5	0	5	5½	5¼	35	32	33
Burbank's Early Maine	J. & Stoke	"	" 16.	" 11.	6	2	6	6½	6¼	59	54	56
Lackey's Early Sweet	Gregory	"	" 17.	" 11.	5	8	7	6	6½	56	48	52
Early Fordhook	Burpee	"	" 17.	" 10.	6	0	6	6	6	52	52	52
Quincy Market	Gregory	"	" 17.	" 12.	6	4	6½	6½	6½	51	46	48
Ford's Early	Ewing	"	" 17.	" 11.	5	10	7	7	7	49	52	50
First of All	Salzer	"	" 17.	" 13.	6	0	6	7	6½	34	39	36
Early Landreth Market	Landreth	"	" 18.	Sept. 6.	8	0	7	8½	7¾	38	55	46
Burpee's Earliest Sheffield	Burpee	Hybrid	" 19.	Aug. 29.	7	0	6	6	6	57	45	51
Adam's Extra Early	Rennie	Flint	" 19.	" 25.	7	6	7	7	7	42	49	45
Henderson's Metropolitan	Henderson	Sweet	" 19.	Sept. 3.	6	10	7½	7	7¼	48	48	48
White Cory	Thorburn	"	" 21.	Aug. 11.	5	10	7	6	6½	49	45	47
Manhattan Sugar	"	"	....	" 11.	4	6	....	4½	....	....	27	....
Moore's Early	Vick	"	....	....	7	0	....	6	....	....	20	....

SECOND EARLY VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900 (ft.)	Height, 1900 (in.)	Length of ears, 1899.	Length of ears, 1900.	Average length of ears for two years.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
Kendall's Early Giant	Darch and Hunter	Sweet	Aug. 21.	Aug. 22.	6	0	7½	6½	7	43	40	41
Maule's XX Sugar	Maule	"	" 22.	" 22.	6	10	8	6	7	42	39	40
Champion Sweet	Darch and Hunter	"	" 22.	" 29.	6	6	7	6½	6¾	28	35	31
Crosby's Extra Early	Steele	"	" 23.	" 27.	6	6	6	6	6	50	69	59
Early Minnesota	"	"	" 23.	" 22.	6	2	7	7	7	31	47	39
Early Market	Rennie	"	" 24.	" 18.	5	11	7	6	6½	59	40	49
Early Giant Sweet	Steele	"	" 24.	" 20.	6	0	7½	6	6¾	52	37	44
Low's Perfection	Rennie	"	" 25.	" 31.	7	6	7½	8	7¾	59	71	65
Child's Honey Dew	Childs	"	" 25.	" 29.	6	7	7	7	7	54	46	50
Melrose	Thorburn	"	" 25.	" 27.	7	0	7	7	7	46	40	43
Boston Market	Darch and Hunter	"	" 25.	Sept. 8.	7	6	7	6	6½	44	35	39
New Champion	Salzer	"	" 25.	" 6.	7	2	7	8	7½	33	37	35
Pee and Kay	Darch and Hunter	"	" 26.	Aug. 31.	7	2	7½	6	6¾	52	27	39
Shaker's Early	"	"	" 26.	" 27.	8	10	8	9	8½	50	50	50

INTERMEDIATE VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900. ft.	Height, 1900. in.	Length of ears, 1899. in.	Length of ears, 1900. in.	Average length of ears for two years. in.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
Black Mexican	Ewing	Sweet	Aug. 28.	Sept. 9.	7	1	7	6½	6¾	71	67	69
Burlington Hybrid	J. & Stoke	"	" 28.	" 7.	9	0	8	7½	7¾	53	64	58
Stabler's Early	Henderson	"	" 29.	Aug. 28.	8	0	8	8	8	39	57	48
Nonsuch	Bruce	"	" 30.	....	7	10	8	8	8	30	46	38
Asylum Sweet	Thorburn	"	" 30.	Sept. 8.	8	0	8	8	8	27	51	39
Tuscorora	Rennie	"	" 30.	Aug. 29.	7	0	8½	7½	8	21	47	34
Moore's Early Concord	"	"	" 31.	Sept. 6	8	6	8	7½	7¾	44	50	47
Perry's Hybrid	Steele	"	" 31.	Aug. 29.	7	10	7½	7½	7½	31	41	36
Russell's Prolific	Vick	"	" 31.	....	8	6	9	8	8½	27	40	33
Amber Cream Sugar	Burpee	"	" 31.	Sept. 8.	7	2	8	8½	8¼	22	53	37
Early Bonanza	J. & Stoke	"	Sept. 1.	" 8.	7	6	7	8	7½	39	49	44
New Early Evergreen	"	"	" 1.	" 8.	7	8	7	7	7	38	29	33
New Honey Sweet	"	"	" 1.	Aug. 31	7	2	7	7½	7¼	33	33	33
Roslyn Hybrid	Thorburn	"	" 1.	Sept. 10.	8	6	8	8	8	38	62	50
Stabler's Nonpareil	Dreer	"	" 1.	" 10.	8	10	8	9	8½	33	40	36
Landreth's Sugar	Landreth	"	" 1.	" 10.	8	1	6½	7	6¾	29	42	35
Early Mammoth Sugar	Bruce	"	" 1.	" 12.	7	10	9	8½	8¾	27	48	37
Hickox Sugar	"	"	" 1.	" 10.	8	2	7	8	7½	26	42	34
Potter's Excelsior	Thorburn	"	" 1.	" 6.	7	2	6	7	6½	18	48	33
Henderson	Henderson	"	" 1.	" 12.	8	6	7	8	7½	14	39	26
Early Eight-rowed Sugar	Thorburn	"	" 2.	" 10.	8	11	8	8½	8¼	39	57	48
Zig Zag Evergreen	Ewing	"	" 2.	" 15.	8	10	7	6½	6¾	35	40	37
Squantum	Henderson	"	" 2.	" 6.	7	2	7½	7	7¼	29	43	36
Triumph Sugar	Thorburn	"	" 2.	" 10.	9	4	8	8½	8¼	23	55	39
New Champion Sugar	Ewing	"	....	Aug. 29.	6	4	....	7	....	....	35	....
Early Champion	Henderson	"	....	" 27.	7	0	....	7	...	....	47	...

LATE VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900. ft.	Height, 1900. in.	Length of ears, 1899. in.	Length of ears, 1900. in.	Average length of ears for two years. in.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
Columbus Market	Livingston	Sweet	Sept. 4.	Sept, 16.	9	6	10	8	9	36	40	38
Bonanza Sweet	Gregory	"	" 4.	" 10.	7	8	7	8	7½	35	51	43
Shoe Peg	Ewing	"	" 4.	" 18.	8	2	6	7	6½	30	47	38
Extra Early Concord	Landreth	"	" 6.	" 8.	8	2	9	7½	8¼	32	48	40
Red Cob Evergreen	Steele	Dent	" 6.	" 13.	5	5	6	6	6	17	41	29
Egyptian Sweet	Rennie	Sweet	" 7.	" 12.	9	0	8	8	8	31	44	37
Ne Plus Ultra	"	"	" 11.	" 15.	8	0	8	7	7½	24	43	33
Country Gentleman	Henderson	"	" 12.	" 12.	7	9	7	7	7	44	58	51
Stowell's Evergreen	Darch and Hunter	"	" 12.	" 12.	9	1	7	7½	7¼	16	42	29
Mammoth Sweet	"	"	" 12.	" 19.	10	0	6	8	7	14	45	29
Old Colony	Burpee	"	" 14.	" 12.	8	1	6½	7	6¾	24	32	28
Original Stowell's Evergreen	J. & Stoke	"	....	" 10.	9	0	....	8	....	....	46	....

PEASE—EXPERIMENT FOR COMPARISON OF YIELDS AND QUALITY.

For the past three years a large number of varieties of garden pease have been tested in the Horticultural Department. In 1899 there were 157 varieties under test, and notes were taken on their relative earliness, productiveness and quality. The length to which the vines grew was also ascertained. From the 157 varieties that were tested, twenty-seven were noted as being the most promising, quality and yield being two of the most important points taken into consideration when judging their merits. This year it was decided to test these varieties in larger plots. Unfortunately, Heroine and Telephone, two good sorts were omitted in this trial. Cleveland's First and Best and Alaska, two very early, smooth kinds of not the best quality, were included in the test to compare the earliness of the others with them.

Twelve hundred selected pease of each variety were sown in drills 100 feet long and 2½ feet wide on May 10 and 11. The pease germinated well and a fine stand was obtained. As each variety became ready for use, the date was recorded and the yields of green pods from the several pickings were also kept. The following table shows the results obtained from this experiment.

By referring to the Farmers' List of Best Vegetables on another page, the varieties recommended will be found.

PEASE—TEST OF VARIETIES.

Name of Variety.	Ready for Use.	Number of Pickings.	Total Yield of Green Pods.	Length of Vine.	Quality.
Early.			Quarts.	Inches.	
Gregory's Surprise	June 29..	3	20	18 to 22	Very good.
Cleveland's First and Best	July 1..	3	26	20 " 22	Medium.
Alaska	" 2..	2	24	24 " 28	"
Station	" 3.	2	22	18 " 21	Very good.
Premium Gem	" 4..	3	36	24 " 28	"
Chelsea	" 4..	4	31	12 " 16	"
Nott's Excelsior	" 4..	2	23	12 " 15	"
Child's Morning Star	" 4..	2	19	30 " 34	"
Exonian	" 4..	2	20	24 " 26	Good.
American Wonder	" 5..	2	22	15 " 20	Very good.
Second Early.					
Nott's New Perfection	" 9..	3	33	22 " 26	Very good.
Gradus	" 9..	2	29	28 " 32	"
English Wonder	" 9..	3	26	16 " 20	Good.
Medium.					
McLean's Little Gem	" 12..	3	36	34 " 40	Very good.
McLean's Advancer	" 14..	3	38	30 " 34	"
Burpee's Quantity	" 17..	2	47	34 " 38	Good.
Late.					
Dwarf Telephone	" 19..	3	40	22 " 26	Very good.
Startler	" 19..	2	41	38 " 42	"
McLean's Prolific	" 21..	2	62	36 " 40	Good.
Yorkshire Hero	" 21..	2	36	30 " 34	Very good.
New Victory	" 22..	2	52	38 " 42	Good.
Champion of England	" 23..	2	60	60 " 66	Very good.
Boston Wrinkled	" 23..	2	54	48 " 52	Good.
Eugenie	" 23.	3	50	48 " 54	"
Juno	" 23..	2	44	30 " 34	"
Stratagem, Improved	" 24..	1	36	28 " 32	Very good.
Veitch's Perfection	" 31..	2	38	60 " 66	Good.

TOBACCO.

Fifty-six varieties of tobacco were grown this year, but there was not time to prepare a table for this report showing the results obtained from them. The yields from six good varieties, however, which were grown on larger plots, have been ascertained and the results are herewith given. The land where this tobacco was grown was a good sandy loam, which had been ploughed in the autumn of 1899. In the spring the soil was given a liberal top dressing of rotted barn-yard manure, which was ploughed under, and then the land was disc-harrowed once and harrowed once with the smoothing-harrow. The seed was sown in the hot beds on April 11, the young plants pricked out into a cold frame on May 22, and planted in the field on June 11, at a distance of 3 x 3½ feet apart. The surface soil was kept cultivated until there was danger of breaking the leaves on the plants. The plants were cut on September 7, being fully matured at that time. They were hung in the tobacco house until dry, and then stripped and the leaves put in hands preparatory to fermenting them.

TOBACCO—TEST OF VARIETIES.

Name of Variety.	Number of Plants.	Weight of 1st Grade.	Weight of 2nd Grade.	Weight of 3rd Grade.	Total Yield per Acre. All Grades.	Condition when Cut.
		Lbs.	Lbs.	Lbs.	Lbs.	
White Burley	511	67½	51¾	39¼	1,286	Ripe.
Improved White Burley	470	59	69¾	20	1,313	"
Zimmers' Spanish	483	33½	59½	33¼	1,086	"
Pryor Blue	385	45	64	28½	1,482	"
Small Havana	495	49½	65	15	1,085	"
Little Oronoka	474	43	62	15½	1,055	"

ARBORETUM AND BOTANIC GARDEN.

The Arboretum and Botanic Garden continues to increase in usefulness and improve in appearance every year. The collection of trees, shrubs and herbaceous perennials is now very large and in many genera few additional species and varieties can be procured. The list of trees and shrubs being tested here, which was published last year, has given much satisfaction and there are many requests for it. It was reported in that list that up to the time of its publication 3,071 species and varieties of trees and shrubs had been tested, of which 1,465 were hardy, 330 half hardy, 229 tender, 307 winter-killed and 740 had not been tested long enough to admit of an opinion being given as to their hardiness. Since the list was published, still further additions have been made. The collection of perennials has also been much increased during the past few years, and it is hoped that in the near future a list will be published of them also.

This year was a favourable one for the trees, shrubs and plants. Though the tenderer things were injured by winter, as usual, it was not exceptionally severe, and the summer being moist nearly everything made good growth. While the grounds were kept in fairly good order during the season, more help is necessary to keep everything in good condition.

In the limited space which may be devoted to the Arboretum and Botanic Garden in the annual report, it is not possible to describe many of the plants which are being grown there, but each year the object has been to present descriptive lists of the very best things. In the report for 1897 a list was published of one hundred of the best ornamental trees and shrubs, and also one hundred of the best herbaceous perennials. In 1898 a supplementary list of good perennials was given, and in 1899 a descriptive list of twenty-five of the best low-growing flowering shrubs and an additional list of good perennials. This year it was thought that a list of the best climbing plants would prove acceptable.

SOME GOOD WOODY CLIMBERS.

There are many homes which could be made much more attractive looking by the judicious use of a few good vines. A house which lacks any pretence of beauty in architecture may have much of the stiffness taken from it by planting a vine where it will break the monotony of a straight wall. Verandahs, summer houses, fences, rocks and old stumps of trees covered with vines will so change the appearance of a place that it will hardly be recognized by one who has known it before. There are so many good hardy native climbers that it is not necessary to go to any expense in procuring something which will produce the desired effect. In the following list some of the best of those described are natives. Climbers usually make rapid growth when once established. The best results will be obtained, however, by preparing the ground well beforehand. Usually the soil about buildings is poor, and if such be the case it will well repay any one to remove it where the vines are to be planted and replace it with some of a good loamy character, thoroughly mixing well rotted manure with it. If such preparation is given the results will almost certainly be satisfactory.

Aristolochia Sipho—Dutchman's Pipe.—Although the Dutchman's Pipe is not as hardy as some vines, it is grown with fair success here. Before beginning to make rapid growth, however, it requires two or three years to become established. The leaves are large, heart-shaped and deep green. This vine, though quite attractive, has a heavier look than some others, and is more in keeping with a massive building than with one of a lighter style. It twines about whatever object comes within reach and does well on a trellis or verandah. The flowers, which are partially hidden by the large leaves, are brown and of peculiar shape, much resembling a Dutchman's pipe. It is a native of the eastern United States, and grows from 20 to 30 feet high.

Celastrus articulatus—Japanese Climbing Bitter-sweet.—This is just as attractive, if not more so, as the native species. The berries are smaller, but more abundant, and there is a greater contrast in colour between the outside and inside of the fruit than there is in *Celastrus scandens*, the colour in this case being yellow and orange. It is a native of Japan, a rapid grower and a very desirable vine.

Celastrus scandens.—Climbing Bitter-sweet, Wax-work.—Next to the Virginian Creepers and Virgin's Bower, this is probably the best native climber that we have. It is a very rapid grower, with pretty bright green leaves, and highly ornamental fruit. It is very suitable for training over summer houses and verandahs, and twines about everything it can get hold of. In procuring this vine, one should be certain that he is getting one which produces both male and female flowers, as some vines have only male blossoms, and in such cases no fruit is produced and much of the beauty of the vine is lost, as the fruit is quite attractive and hangs on most of the winter. The berries are of an orange colour until they are cracked open by frost, when the interior, which is scarlet, is revealed.

Clematis Jackmanni.—The large flowered Clematis are well represented by this superb variety, which is one of the best of them. The flowers are very large and rich, violet purple in colour, with a velvety appearance. It is a very free bloomer and remains in flower for several weeks. Where a strong colour effect is desired this is a good plant to use. There are now many varieties of large flowering Clematis, and a good range of colour can easily be obtained.

Clematis ligusticifolia—Western Virgin's Bower.—This species is a native of the North-west Territories and British Columbia, and while it may not prove as satisfactory in the east as *C. virginiana*, it should prove very valuable when cultivated in those parts of Canada where it is native. The leaves are smooth and glossy, and are more attractive than the ordinary Virgin's Bower. The flowers are numerous, small and white, and the vine looks very beautiful in midsummer, when it is in full bloom.

Clematis paniculata—Japanese Clematis.—No climber introduced in recent years has proved as satisfactory and as beautiful as this one. It is not as hardy as *C. virginiana*, but it is much finer when in bloom. The flowers are larger than *C. virginiana*, *C. ligusticifolia* or *C. Vitalba*, and are much whiter. This attractive vine does not bloom until autumn, and is at its best during the month of September, when other kinds have gone to seed, at which time it is a perfect mass of attractive white, sweet-scented flowers. It kills back considerably every winter, but the growth is so rapid in the spring that this is not a great disadvantage, unless one desires to have a large surface covered, when *C. virginiana* is better.

Clematis virginiana—Virgin's Bower.—Next to the Virginian Creepers, this is the most satisfactory native climber to plant, and the most satisfactory where the former are troubled with thrips. It is a very rapid grower, and soon covers anything it is planted near. It clings by tendrils, and should have something to which these can fasten. The leaves are of a lively green colour and of graceful form. About midsummer the small greenish white male flowers come into bloom, and these are produced in such abundance that the vine is fairly covered with them. The female flowers are also attractive.

Clematis Vitalba—Traveller's Joy.—A European Clematis which very much resembles *C. virginiana*. It is a rapid grower and quite hardy. Where it is more convenient to get this species than the native one it may be planted with the certainty that it will give good satisfaction.

Lonicera hirsuta—Hairy Honeysuckle.—The honeysuckles make good climbers, and this native species should be particularly valuable in the colder parts of the country, and as it grows naturally as far west as Lake Superior, it will probably prove hardy anywhere in Ontario or the Province of Quebec. It is a profuse bloomer, being covered with rich yellow flowers during part of June. Unfortunately, it does not, like *L. sempervirens* and *L. Periclymenum*, continue blooming during the summer. It is very attractive when the vine is kept compact, as the flowers are then more massed together, and show off to better advantage.

Lonicera Periclymenum—English Honeysuckle, Woodbine.—Though not quite as hardy as the next species, this honeysuckle will succeed very well if it is not too much exposed. It blooms about the middle of June, and the flowers are bright pink outside and yellow within, and have an agreeable spicy odour, which makes it a desirable vine for planting by or near the house.

Lonicera sempervirens—Scarlet Trumpet Honeysuckle.—A very attractive climbing honeysuckle, blooming almost continuously from the first week of June until late in autumn. The profusion of bright, scarlet, trumpet-shaped flowers produce a fine effect when it is trained against a house or wall. It is a native of the Eastern States, and is quite hardy at Ottawa.

Lycium chinense—Chinese Matrimony Vine.—This is a graceful climbing shrub which is very useful for covering rocks, stumps of trees, or anything else where a tall growing vine is not required. Neither the leaves nor flowers are particularly ornamental, but the graceful habit of the plant commends it, together with the fact that in the autumn the bright scarlet fruit gives it a very attractive appearance. There is a variety, *macrocarpum*, which is an improvement on the ordinary form, in that the fruit is larger, and hence more conspicuous. The ordinary Matrimony Vine, *L. europaeum*, is a desirable climber also, but it is not so good as *L. chinense*, as the fruit is much smaller.

Vitis inconstans (*Ampelopsis Veitchii*)—Japanese Ivy.—The Japanese Ivy is not thoroughly satisfactory in Ontario and Quebec, as it kills back more or less every year, and sometimes is killed out altogether. In the warmer parts of these provinces, however, it may be grown with fair success. It is a beautiful vine and clings so tightly to the wall on which it is trained that it is unsurpassed in this regard. The leaves also are of an attractive green colour in summer, and at times are highly coloured in autumn. When grown, a north or west side of a building is the best site. Many make the mistake of putting it on the south side. While this cannot always be avoided, a place where it is not much exposed to the sun is better. It appears to be the thawing and freezing of the vine in early spring which often has such an injurious effect upon it. This injury is not as great on a north or west exposure. For the first year or two this vine should be protected in winter until it gets well established. Something which will not readily absorb the heat should be chosen for this purpose. Straw is a very good material to use, if held in place by something else.

Vitis quinquefolia (*Ampelopsis quinquefolia*)—Virginian Creeper.—This fine climber has several points of merit which commend it to those who desire a hardy, graceful, attractive vine. It is a rapid grower, and being a native of Ontario and Quebec, is perfectly hardy. Its glossy, green leaves become very brilliant in autumn, when they assume many shades of red. Although it has tendrils by which it clings if there are crevices into which they can be inserted, it will not cling to a wall where there are not such places, and has to be supported in some other way. It is very desirable for training over summer houses, fences, verandahs, and even on walls, where it falls in graceful festoons and becomes very attractive. Unfortunately, it is much subject to thrip, and while there is a remedy in whale oil soap, tobacco water, and kerosene emulsion, they have to be applied very persistently. Where there is a good circulation of air or where the vines are often moved by the wind, the thrip is not so troublesome.

Vitis quinquefolia hirsuta—Self-fastening Virginian Creeper.—The advantages of this vine over the ordinary Virginian Creeper are so great, in certain respects, that it should be grown in preference to the latter if a vine is desired for covering a wall. This variety has smaller leaves than the ordinary species, and while those of the latter are quite smooth and shiny, those of the former are downy on both sides. The tendrils of *hirsuta* are short and furnished with large discs, by means of which this vine clings to a brick or stone wall almost as tenaciously as the Japanese Ivy. It is much neater looking than the ordinary form, and needs practically no attention as regards training. The leaves colour about as highly at Ottawa as the common Virginian Creeper. This variety may be found growing wild in the woods in the vicinity of Ottawa, and has also been noticed in the Eastern Townships of Quebec.

Vitis riparia—Riverside or Sweet-scented Grape.—The grape vine makes a highly ornamental climber, as it is a rapid grower and very graceful. This native species has the great advantage of being perfectly hardy and of having very highly perfumed blossoms. The male and female flowers of this species are borne on different vines, and if the delicious perfume is to be had one with male flowers must be planted. One drawback to the wild grape being used as a climber near the house is that it is subject to the attacks of thrips, which disfigure the leaves very much. In exposed places, however, where there is a good circulation of air, they will not be so troublesome.

The Wistarias and Actinidias are also good climbing shrubs where they can be grown successfully. The former have bloomed at Ottawa, but they are not very satisfactory, except in the mildest parts of the province of Ontario.

ANNUAL CLIMBERS.

In addition to the shrubby and perennial climbers in the foregoing list, there are some fine annuals which may be used with good effect, of which the sweet pea and nasturtium furnish an abundant supply of lovely flowers for cutting for many weeks during the summer. The following are those which will be likely to give the greatest satisfaction:—

Sweet Pea.—The sweet pea is one of our most popular flowers, and justly so. For variety of colour, delightful perfume and continuity of bloom it is difficult to surpass. Unfortunately, there are many who do not grow this beautiful flower who might if they would. The chief requisites to successful sweet pea culture are early planting, plenty of moisture and good drainage. These are all nearly equally important. Sweet pease should be planted as soon as the ground is dry enough in the spring, as this will give the plants a chance to root properly before warm weather sets in, and also give the roots an opportunity of getting down into the moist, cool soil. A week or two of delay in planting will result, as a rule, in much poorer flowers. A site should be chosen where the vines will get full sunlight most of the day. This is important. Well rotted manure should be dug in and well mixed with the soil the previous autumn. This will usually give better results than manuring the soil in the spring, as there is danger of making the ground too loose and dry. A trench should be made about five or six inches wide and four inches deep. The pease should then be sown rather thinly along the bottom of it. An ounce of seed to a row thirty feet long is considered a fair amount. The seed should now be covered with about two inches of fine soil. If much more is put on, the plants will not come up as readily. After they are about six inches high the trench may be filled level with the soil, the object being to get the roots well down, but if there is danger of the ground drying out, the trench and each side of it may be covered with hay, straw or leaves, which will act as a mulch and help to keep the soil cool and moist, and the rain will be caught in it. The brush or trellis should now be put down. If this is delayed the vines will be injured when attempting to train them.

The surface soil should be kept loose with a hoe during the summer, as this will encourage growth and help to retain the moisture in the ground. It is well worth the trouble to water sweet pease if the soil is not naturally moist, as the flowers will be larger and there will be more of them. Sweet pease should begin to flower during the first week in July, and there should be a continuous succession of bloom until severe frost in the autumn. To keep them blooming, however, it is very necessary to prevent the flowers from going to seed and to keep the soil moist. If all the flowers are not desired or cannot be disposed of, those not wanted should be nipped off.

There are a great many varieties of sweet pease offered for sale, and it is puzzling to many to know which to choose. Most people, however, buy mixed seed, not knowing what varieties they are getting. These are not as satisfactory as named varieties. The following eighteen sorts, which give a good variety of colour, are recommended as being among the best:—

Blanche Burpee, Countess of Powis, Lottie Hutchins, Lady Mary Currie, Prima Donna, Prince of Wales, Improved Salopian, Lady Grisel Hamilton, Navy Blue, Triumph. Edward of York, Stanley, Golden Gleam, Coquette, Aurora, Ramona, Maid of Honour, Mrs. J. Chamberlain.

Nasturtium.—Next to Sweet Pease, Nasturtiums are the most satisfactory annual climbers that furnish flowers for cutting. Like Sweet Pease, a continuous succession of brilliantly coloured flowers may be kept up from early summer until late autumn. The soil in which Nasturtiums are planted should not be very rich or the plants will run to vine rather than flowers, and this is not desirable. A site should be chosen where the vines will be exposed to full sunlight most of the day, as Nasturtiums bloom better so situated. The seeds should not be sown as early as Sweet Pease, as they are liable to rot when the ground is cold. It should be planned to have the young plants coming up about the third week of May. If they appear earlier, there is danger of their being injured by frost. The soil should be well prepared by digging and raking, and the seed sown about 2 inches apart and from 1 to 2 inches deep. After the young plants are well established, they should be thinned to from 5 to 6 inches apart. The surface soil should be kept loose during the summer to encourage the growth of the vines and retain moisture in the soil. Nasturtiums need more care in training than Sweet Pease, as they have no tendrils to cling with.

Nasturtiums are very effective, as the leaves are bright green and the flowers of such lively shades of yellow, brown and crimson that the contrasts are very fine. If planted where they may be trained over any objects about the grounds suitable for the purpose, they make a very pleasing effect.

There are two strains of climbing nasturtiums which are much grown, the first known as Lobbianum, and the second as Tall Nasturtiums. The former have smaller flowers, but are more profuse bloomers than the latter; but both are good. Some fine colours may be obtained by planting the hybrids of Madame Gunter. Good mixed seeds will be found quite satisfactory.

Variegated Japanese Hop.—The so-called Japanese hop is an annual, and this is a variety of it. It is one of the most rapid-growing vines that can be planted. Part of the leaf is almost pure white and part gray, making the contrast with the remaining green portions very effective. The seed should be sown early in the spring and the plants thinned out well after they are large enough for the variegations of the leaf to be distinguished. Some plants are more variegated than others and have the white parts of the leaf whiter, and these should be left. The seed should be pinched off when they form, as they rather spoil the otherwise fine effect of the vine.

Scarlet Runner.—Though old-fashioned, the scarlet runner is still one of the most attractive of annual climbers. It is such a free bloomer that the effect produced by the scarlet flowers is very good. The seed should be sown when there will be no danger of frost after the young plants appear above ground.

Morning Glory.—This is another old-fashioned flower, but one which deserves a place, where there is room for it. The seed should be sown early in spring, if the best results are to be obtained. The Imperial Japanese Morning Glories, which were introduced a few years ago, are larger than the ordinary kind and more brilliantly coloured.

Cobaea scandens.—Although this vine is a perennial, it can only be treated as an annual when grown outside, as it winter-kills. To get good results, the Cobæa should be started in a cold frame and planted out in the open towards the end of May or about June 1, it being very tender. It makes a rapid and luxuriant growth during the summer and comes into bloom towards the latter part of the season. The flowers are about 2 inches in diameter and are greenish white or purple, according to the variety planted. The purple flowering variety is the best, as the vine has purple stems, making the contrast with the leaves better. The flowers, also, are prettier than the white ones. Unfortunately, the season of this vine is not long, as it is killed by the first frosts of autumn.

Madeira Vine.—This is another old favourite which must be treated as an annual. The root should be planted in the spring, after danger of frost is past. The growth of this pretty climber is very rapid, and it will cover a large surface during the summer. Its thick, bright green leaves are the chief attractions of the plant. In the autumn, the roots should be taken up and stored for the winter.

Canary Bird Vine—Tropaeolum canariense.—This is a very pretty climber which bears an abundance of small bright-yellow flowers, which fancy may compare to a bird with wings half extended. It is a rapid grower and soon runs over the trellis, lattice-work, or other object which is placed for its support. The seeds should be sown early.

There are a large number of other annual climbers, but those just described are among the best. Among these are the gourds, which are quite attractive. When trained over fences, the varied shape and colour of the gourds, which are produced in abundance, give an odd appearance to the vine.

Central Experimental Farm, Ottawa. Nitrogen and Water Analysis Laboratory.

Central Experimental Farm, Ottawa. Main Chemical Laboratory.

REPORT OF THE CHEMIST.

(Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C.)

Ottawa, December 1, 1900.

Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the fourteenth annual report of the Chemical Division of the Experimental Farms.

The work of the past year has been of an exceedingly varied character, investigations relating to many special branches of agriculture and the solution of problems affecting farming in different parts of the Dominion, being undertaken. In addition to this class of work, direct assistance has been given by the analysis of typical representative samples sent in by farmers. Time, however, has not allowed us to satisfy all the demands made in this connection, for we recognize that original research must have the first claim upon our attention.

In the following paragraphs a brief account of the matters above referred to is given.

Soils.—Samples representative of a large area in the vicinity of New Westminster, B.C., occupied by a number of fruit-growers and market gardeners have been submitted to analysis. The results are accompanied by suggestions regarding the best means to supply the soil's deficiencies.

Soils from the Experimental Station of the North-west Territories, at Calgary, Alta., collected from virgin and cultivated areas, as well as from irrigated and non-irrigated lands, have been carefully examined, and several interesting features revealed in connection with the effect of irrigation.

A cultivated sandy loam from the neighbourhood of Annapolis, N.S., has also been analysed and reported on.

Many samples of soil have been sent in by farmers, but since they only received a partial analysis no account of them has been recorded in the report.

Valuable results in the conservation of soil moisture by summer fallowing, obtained from an investigation carried on from May to November with samples collected monthly on the Experimental Farms at Brandon, Man., and Indian Head, N.W.T., are recorded. The exceptional character of the season this year in the North-west afforded specially favourable conditions for the prosecution of this research, and as a result we are able to publish data of a most instructive order.

We have also been able to trace the course of nitrification throughout the summer in these North-west soils, though there are doubts, owing to the great drought in the early part of the season, as to whether the results obtained should be considered as normal.

Fertilizers.—Information as to the agricultural value of marl, woollen waste, wood ashes, from samples examined in the laboratories is given.

Foods and Feeding Stuffs.—Under this caption many interesting chapters will be found. Rape as a forage plant is being widely introduced. The prominence that this crop has received recently made it desirable to ascertain its feeding value at different stages of growth. This has accordingly been done and is now reported on.

The relative feeding value of certain varieties of mangels, carrots, turnips and sugar beets has been determined and tabulated.

Various milling by-products, such as bran, cotton-seed meal, cocoa-nut meal, corn meal, &c., have been submitted to analysis and accounts regarding them are to be found in the present report.

Certain comparatively new and important legumes have been examined as to their feeding value. Several of these, as far as is known, have not previously been analysed, and consequently the information gained will be of peculiar interest.

A number of samples of sugar beets have been tested as to their sugar content and purity. These were received from the Manitoba Government, Winnipeg, from the Experimental Farms at Brandon and Indian Head, from the North-west Irrigation Company, Lethbridge, Alta., and from Prince Edward Island. The data are accompanied by conclusions as to the value of the beets for sugar making purposes.

Wheats.—A comparative study of the well-known Red Fife wheat with certain cross-bred wheats has been made. These latter, originated by Dr. Saunders, are the Percy, Stanley and Preston, and were obtained by crossing the Red Fife with earlier ripening sorts, chiefly from Northern Russia. The close relationship of these wheats with the parent Red Fife is obvious from an examination of the data.

A rumour being prevalent that wheat of the crop of 1899 contained an excessive amount of moisture, thus impairing its keeping qualities, a number of moisture determinations were made, the samples being furnished by Mr. D. Horn, Chief Grain Inspector, Winnipeg. The results show that the moisture was not excessive or abnormal.

Insecticides and Fungicides.—Various compounds, such as Arborine, Harvesta, Canadian brands of whale oil soap, &c., have been examined and their general composition, with remarks as to their probable effectiveness, given.

Well Waters from Farm Homesteads.—This useful work has been continued and the results of those samples submitted to complete analysis during the past year are appended in tabular form, together with deductions as to their relative purity.

Correspondence.—From December 1, 1899, to November 30, 1900, 1,126 letters were received, and 1,453 despatched.

Tuberculin.—The tuberculin supplied to the Dominion Veterinary Surgeons has been prepared and forwarded, as formerly, from the Farm laboratories. During the twelve months ending November 30, 1900, 20,903 doses, as against 17,179 doses in the year previous, have been sent out.

Soft Pork Investigation.—As may be well known, we have been engaged during the past eighteen months on a research, the object of which was to ascertain the cause or causes of 'softness' in pork. A preliminary report, giving many of the results obtained to date, appeared in our last year's report. The analyses in connection with the first feeding trials were completed last June, the carcasses of 187 pigs having been examined and chemical and physical data of the fatty tissue, taken from the shoulder and from the loin, obtained. Many of the results were of such a striking character that it was thought desirable to make a second feeding trial which would include most of the important rations of the first trial, in addition to others of a slightly modified character. This second series of experiments was commenced in the early months of the present summer, 102 pigs being placed in pens of 6 each, under the varying conditions of the trial. Of these animals, in the neighbourhood of 60 have to date been slaughtered and analysed. The data so far are strongly corroborative of those obtained in the first series, and there can be no doubt but that we shall be in possession at the close of this experiment (which will be in about two months' time) of very satisfactory and reliable information regarding the effect of various food stuffs on the quality of pork.

The amount of laboratory work in connection with this research has been enormous, but the growing importance of the English export bacon trade—both to farmers and pork packers—may be urged as a justification for the exceedingly large though necessary expenditure of time. Already the investigation has yielded important and valuable results (see pages 151 to 155 Report for 1899), and there is every probability that still more valuable deductions may be drawn from the data at the close of the present experiments. It is proposed to publish these conclusions in bulletin form, as soon as the laboratory work is finished, which, as we have said, will be in about two months' time.

Samples Received for Analysis.—In the following schedule we furnish the number and indicate the character of the samples received during the past year for examination and report:—

SAMPLES Received from Farmers for Examination and Report, November 30, 1899, to December 1, 1900.

Samples.	British Columbia.	North-west Territories.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	12	38	39	8	7	2	8	1	115	33
Mucks, muds and marls	...	...	...	8	1	3	4	8	24	9
Manures and fertilizers	...	...	...	3	4	...	2	3	12	5
Forage plants and fodders	...	13	37	29	3	2	2	1	87	11
Well waters	3	7	11	34	8	8	4	...	75	...
Miscellaneous, including dairy products, fungicides and insecticides	1	2	8	6	8	2	5	3	35	13
Total	16	60	95	78	31	17	25	16	348	70

Acknowledgments.—Naturally, with the ever increasing work of the Division, more and more of that which is purely analytical falls to the lot of the assistant chemists. The past year, as evidenced by this report, not to speak of the very large number of analyses that have been made in connection with the soft pork investigations, has been an exceedingly busy one, and I am consequently more than ever indebted to my assistants for their valuable aid.

Mr. A. T. Charron, B.A., First Assistant Chemist, has continued to discharge his duties with fidelity and skill. From the date of his appointment, Mr. Charron has taken a keen and intelligent interest in agricultural research and investigations, and has afforded me most valuable help in the work of this Division.

To Mr. H. W. Charlton, B.A.Sc., Second Assistant Chemist, my thanks are also due. He has been most assiduous in his work, all of which has been characterized by care and thoughtfulness, and I am pleased to bear testimony to his good services.

The clerical labours involved in carrying on the various parts of our work is now very considerable. It includes stenographic and typographic and secretary work in general, in addition to the calculation and posting of analytical results. In all of this we have had the help of Mr. J. F. Watson, who, as in former years, has earned my thanks for a careful and painstaking performance of his duties.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

CANADIAN SOILS.

BRITISH COLUMBIA.

New Westminster.—A sample of the surface soil, together with its underlying subsoil or hard-pan, representing the character of the soil on the peninsula formed by the Fraser river and Burrard inlet, have been submitted to careful and complete analysis. The examination was undertaken with a view of rendering assistance to the fruit-growers, market-gardeners and farmers in the neighbourhood of New Westminster, who had found considerable difficulty in profitably working this soil. The collection of the soils was made by Mr. W. J. Brandrith, Secretary B. C. Fruit-growers' Association, New Westminster, who, speaking of the samples, under date of February 20, 1900, says:

'No. 1 is a virgin soil; it has never been disturbed by the hand of man, but thirty years ago a very destructive fire swept over the whole district. The timber had been chiefly cedar; a second growth of red fir, poplar and willow is now growing. The depth of soil to the hard-pan varies from 6 inches to 5 feet, and averages about 2 feet 6 inches. The soils were taken from lot 25, group I., N. W. district, municipality of Burnaby, and distant about 27 chains from the northern boundary of New Westminster. It is a very fair sample of the soil of the whole peninsula formed by the Fraser river and Burrard inlet.

'No. 2 is from the hard-pan underlying No. 1. It has been exposed to the air, but not to the rain, since September 26, 1899.

'No. 3 is from the hard-pan, taken from a depth of 2 feet in the hard-pan, or 5 feet from the surface of the soil.'

Analysis and Report—No. 1.—The soil has all the appearance of a light, sandy loam. It contains a considerable amount of gravel and small pebbles, as well as of undecomposed root fibre. Tested with litmus paper, it gives a strong acid reaction. After preparation, the fine earth (which in the air-dried condition is of a greyish-red colour) was submitted to analysis.

Nos. 2 and 3 are light grey in colour. They consist of firmly-cemented masses, chiefly of sand, with pebbles intermixed. To the eye there is no indication in either of them of humus, and they have the appearance of being exceedingly poor and refractory.

ANALYSIS of Soils (water-free), Municipality of Burnaby, B.C., 1900.

Number.	Soil.	Organic and Volatile Matter	Clay and Sand.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Potash.	Phosphoric Acid.	Soluble Silica.	Carbonic Acid, &c., (undetermined).	Total.	Nitrogen.	Available.		
													Potash.	Phos. Acid.	Lime.
1	Surface	9·00	77·98	11·65	0·35	1·26	0·12	0·13	0·12	......	100·61	·148	·0088	·0049	·0039
2	Hardpan, 2 feet from surface	4·07	82·14	11·56	0·70	1·18	0·15	0·13	0·09	......	100·02	·041	·0062	·0173	·0490
3	Hardpan, 5 feet from surface	3·60	82·75	11·22	0·36	0·65	0·16	0·13	0·08	1·05	100·00	·028	......	......	......

No 1.—Surface soil. The chief constituents to consider are potash, phosphoric acid, and nitrogen and lime. Our previous work on Canadian soils would show that good examples from uncultivated areas will, as a rule, contain from ·25 to ·50 per cent potash, from ·15 per cent to ·25 per cent phosphoric acid, from ·15 per cent to ·2 per cent nitrogen, and from ·5 per cent upwards of lime. Many of our richest

soils have given numbers far larger, but these may fairly represent the limits exhibited by soils of good, medium quality. The amounts of potash, phosphoric acid and lime designated in the table as available are those obtained by digesting the soil with a one per cent solution of citric acid in the cold. English results seem to justify the assumption that less than ·01 per cent of phosphoric acid, so obtained, indicates the soil's need of phosphatic manure. With regard to the available potash, Dr. Dyer, who showed that the acidity of root sap was approximately equal to the afore-mentioned solvent, says that when such potash falls below ·005 per cent, potash fertilizers would prove valuable. Judged by these standards, we are obliged to confess this soil as considerably below the average in all its important elements, save perhaps in available potash.

Humus and Nitrogen.—It is extremely doubtful if commercial fertilizers could be used profitably on this soil unless supplemented, or rather preceded, by organic manures. When the store of humus has been increased, the soil will be more retentive of and responsive to such plant-food as may be supplied in chemical fertilizers, and further it will be warmer and furnish a more comfortable medium for seed germination and root extension. Barnyard manure, naturally, stands first in importance as a source of soil humus; it would be difficult to overestimate the value of this manure for soils such as we are discussing. Not only for its organic matter, is it to be recommended; as a supplier of nitrogen and a considerable amount of mineral matter in a more or less available condition, it has a distinct value.

Unfortunately, in the majority of cases, especially where there is a considerable area tilled, there is not a sufficiency of manure, and it then becomes of the highest importance to know what can be most economically used as a substitute. Where swamp muck occurs, this material may be utilized, first being piled and allowed to dry out and then fermented as in the compost heap, either with manure or with lime or wood ashes. The air-dried muck may be employed as an absorbent in the cow stable, pig-pen, &c., to absorb the liquid manure. In this way a double purpose is served—the valuable liquid portion of the manure, which might otherwise be lost, is retained, and the fertilizing elements in the muck set free. Good samples of air-dried muck will contain from 65 per cent to 85 per cent organic matter, and from 1·25 to 2·5 nitrogen.

Possibly the only feasible plan of furnishing humus and nitrogen over large areas is by the turning under of a growing crop of clover or some other legume. This is termed green manuring, and is certainly to be regarded as the most economical and one of the quickest methods of replenishing the soil's humus. The benefits to be derived from green manuring, especially when a legume is used, have so repeatedly been set forth in our past reports that it may not be necessary to speak at any length on that subject. It is well to emphasize, however, in this connection, three points: first, if the soil is too poor to grow clover, buckwheat or rye, may be ploughed under for a year or two and the land thus made suitable for clover; secondly, that a dressing of wood ashes or a fertilizer containing potash and phosphoric acid will very much help the clover, and, thirdly, there will be no practical enrichment of the soil with nitrogen, unless a legume is used, since the legumes only have the ability (by the means of certain germs that reside in nodules on their roots) to appropriate and store up the free nitrogen of the air.

Lime.—The analytical data show that this soil is by no means rich in lime, and its well marked acidity accentuates this fact. The land evidently stands in need of lime, not only as a source of plant food, but to correct that sourness which is injurious to most farm crops. Since it is not wise to make heavy applications of lime, and since this element has the tendency to work or wash down into the subsoil out of the reach of the roots, the application of, say, 20 bushels per acre every second or third year, will prove better practice than a larger dressing at greater intervals. If phosphoric acid is applied in the form of Basic slag, much less lime than that indicated will be necessary, since that fertilizer contains a considerable proportion (usually 12 per cent to 15 per cent) of free lime.

Shallow culture, i.e. shallow ploughing with an occasional loosening, but not bringing to the surface, of the subsoil is to be advised for this and similar soils. It seems desirable owing to its light and hungry character to keep the humus, lime and other fertilizers as far as possible in the first 4 or 5 inches of soil. A deep tilth is undoubtedly a feature of great value, but it can scarcely be economically produced and retained in very light and sandy soils. For further details as to the economical improvement of poor and exhausted soils, the reader is referred to the report of this Division for 1899, page 133, et seq.

Commercial Fertilizers.—In the question of commercial fertilizers it will only be possible to indicate the general principles to be followed, since the nature of the crop to be grown and the past history of the field must necessarily be taken into consideration before definite formula for any specific purpose can be suggested. The following remarks, however, may be useful :—

Nitrogen.—Of the commercial forms of organic nitrogen in British Columbia, fish-waste prepared from the offal of the canning factories, sometimes known as fish-meal or fish-pomace, holds a high place. Its composition will vary according to the parts of the fish that predominate in its preparation ; thus, some samples may contain between 2 and 3 per cent of nitrogen, and 10 to 15 per cent of phosphoric acid, while others possess 5 to 7 per cent of nitrogen and 2 to 3 per cent phosphoric acid. This fertilizer, it is obvious, may be used to supply two of the three elements generally necessary, but should be supplanted by a potash manure—such as Kainit, muriate of potash, or wood ashes.

We may regard it as a concentrated and quick acting manure, best used as a top dressing or applied to the ploughed land and lightly harrowed in before seeding. It has been applied with success to grain crops and grass lands especially, and gives the greatest returns on light, warm, well-drained loams. For an ordinary dressing, a mixture of 500 pounds of fish-meal and 100 pounds of muriate of potash per acre is suggested.

Nitrate of soda and sulphate of ammonia furnish large amounts of readily assimilable nitrogen. Undoubtedly the former, considering the character of the soil, will be the better; for acid soils and soils deficient in lime sulphate of ammonia may do positive harm. From 100 pounds to 200 pounds per acre may be applied in several applications (at intervals of a few weeks) as a top dressing during the earlier months of growth. The great solubility of nitrate, points to the advisability of never applying it save when there are growing plants to make use of it, and the economy of several small dressings, rather than one large one at the opening of the season.

Phosphoric Acid.—Bone meal, superphosphate and basic (Thomas) slag are the chief phosphatic fertilizers obtainable, leaving out of consideration fish pomace, already referred to. Bone meal is a source of nitrogen also, containing from 2·5 to 4·0 per cent of this element. Its phosphoric acid is not immediately assimilable, but becomes so gradually in a soil that is warm, moist, and well drained. It is probably better suited for grass lands and orchards than for crops with a short season of growth. The usual application lies between 300 and 500 pounds per acre.

Owing to the sourness of the soil of this tract and its deficiency in lime, the writer is of the opinion that basic slag, finely ground, would be found a very useful source of phosphoric acid. It contains in the neighbourhood of 17 per cent phosphoric acid, and 15 per cent free lime. Its application may be from 300 to 500 pounds per acre. Such excellent results have been obtained from this fertilizer in Germany and England, that it would appear to be well worth trial, especially on soils similar to those we are now considering. Further information regarding basic slag will be found in the report of this division for 1898.

Potash.—Unfortunately, it appears that wood ashes—a most valuable source of this element—are not purchasable in British Columbia.

To those in proximity to the coast, sea-weed will prove a cheap and valuable manure, since it contains considerable amounts of potash and nitrogen. Unless well dried, it would scarcely pay to freight sea-weed any distance inland, and in any case it is advisable to allow the sea-weed to lose a portion of its water before hauling to the farm.

Kainit, muriate of potash and sulphate of potash are potassic manures imported from Germany. Kainit contains about 12 per cent actual potash ; muriate and sulphate about 50 per cent actual potash. These fertilizers should always be bought on guaranteed analysis.

The average application of the muriate and sulphate is 100 pounds per acre ; of the kainit, about 400 pounds per acre. As the winter season in this district is always more or less open and rainy, the writer is of the opinion that sp.ing application of these fertilizers would prove the most profitable.

Most poor and exhausted soils usually respond best to a complete fertilizer ; that is, one that contains all three of the elements of plant food—nitrogen. phosphoric acid and potash. The proportion of each of these most economical to use must, however, be largely determined by the character of the crop to be grown, the nature of the past manuring and the results of careful experimenting on the soil with the crop under consideration. The amounts we have given in this report are those commonly employed ; more specific instructions require a knowledge of the circumstances. Those desiring further information on this subject are invited to place themselves in correspondence with this division.

NORTH-WEST TERRITORIES.

In August, 1899, samples of soil from the north-west quarter, section 21, township 23, range I, west of the fifth meridian, were received from the Commissioner of Agriculture for the North-west Territories, with a request for their analyses. Upon this tract of land the agricultural experimental station of the North-west Territories is situated (Calgary), and the location from which the samples were collected is the bench land of a valley falling away from the banks of the Elbow. Mr. Chas. W. Peterson, Deputy Commissioner of Agriculture, North-west Territories, writing of the soils, says that the valley at this point is about one mile in width, that a few poplars are appearing on the bench, and that cotton-woods and spruces are growing well on the river bottom. The soil from Plot 1 (*see* table of analyses) 'has been cultivated for a long time and is full of weeds.' The soil of plot 2 is 'virgin prairie, and well fitted for either cultivation or grazing.' Plots 1 and 2 are closely adjacent areas.

Two further samples from the North-west government, and collected on south-west quarter section 15, township 23, range 1, west of fifth meridian, were forwarded in December, 1899. Writing of these soils, Mr. Peterson says that : 'One (plot 3 in table) is taken from dry, unirrigated land, fifty feet from upper side of irrigation ditch, while the other (plot 4 in table) is taken from irrigated land, 50 feet from lower side of irrigation ditch and 100 feet from the foregoing sample. The surface soil on this area is from 2 to 6 inches deep, and the general character of the locality may be described as rolling prairie. Stunted poplars grow on south side of the valley, which is an old water course, 1.000 feet wide. Under irrigation it would make very good grazing land and produce fair crops of grain.'

All the foregoing surface soils were accompanied by their sub-soils, but, unfortunately, time did not permit the examination of the latter.

ANALYSIS of Soils (water-free), North-west Territories, 1900.

Plot.	Locality.	Organic and Volatile Matter.	Clay and Sand.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Potash.	Phosphoric Acid.	Soluble Silica.	Carbonic Acid, &c. (Undetermined).	Total.	Nitrogen.	Available. Soluble in 1% Citric Acid. Potash.	Phosphoric Acid.	Lime.
1	NW. ¼ Sec. 21, T. 23, Rg. 1, W. 5th Mer.	18·61	73·05	6·32	1·08	0·35	0·44	0·25	0·02	.	100·12	0·660	·0320	·01069	0·592
2	NW. ¼ Sec. 21, T. 23, Rg. 1, W. 5th Mer.	13·69	76·71	7·69	0·71	0·43	0·52	0·21	0·01	0·03	100·00	0·530	·0349	00928	0·498
3	SW. ¼ Sec. 15, T. 23, Rg. 1, W. 5th Mer.	16·12	76·56	6·30	0·99	0·90	0·38	0·24	0·08	....	101·48	0·549	·0279	·00390	0·440
4	SW. ¼ Sec. 15, T. 23, Rg. 1, W. 5th Mer.	15·30	75·52	6·39	1·28	0·98	0·38	0·18	0·05	....	100·08	0·574	·0353	·01201	0.568

Plot No. 1.—Surface soil, marked 'Cultivated': It has the appearance of a rich loam of good tilth and one capable of yielding good crops when supplied with a sufficiency of water. It is quite black from the presence of organic matter and presents very many features in common with the fertile, black loam of the prairie.

Plot No. 2.—Surface soil, marked 'Virgin prairie': Very similar in appearance to that of Plot 1, but its organic matter is more fibrous and consequently less humified.

Since in all essential particulars these soils are of the same nature and character, it will be of advantage to discuss their data together.

Both soils may be considered as light to medium loams, sand predominating, rich in plant food and especially so in organic matter and nitrogen. Tested with litmus paper, neither show acidity or alkalinity. A careful examination proves the absence of all deleterious and alkaline matter.

We cannot be said as yet to have established standards of fertility for Canadian virgin soils, but from the examination of a number of such soils we have arrived at certain limits between which most good agricultural soils are to be found. These limits as regards nitrogen, potash, phosphoric acid and lime, are discussed at length in the report of this Division for 1897, and in brief on pages 148, 149 of the present report. A reference to these figures and to the data presented in the foregoing table gives evidence of the excellent quality of both of these soils; they are undoubtedly well supplied in all the essential elements of plant food, a very fair proportion of which appears to be in a more or less immediately available condition.

Though the soil from Plot 1 is stated to be cultivated, and from Plot 2, as virgin prairie, a comparison of their data does not reveal any exhaustion of fertility in the former due to cropping; indeed, in several important features No. 1 is the better of the two. In potash only is No. 2 the richer. It is quite possible that these soils were not originally identical; but whether such be the case or not it is quite evident that they do not serve to illustrate that truth of which we have in past reports brought forward several instances, namely, that there is a marked decline in both 'total' and 'available' plant food, due to successive cropping in cases where no form of manuring has been practised.

A special inquiry in regard to these soils was with respect to their richness in lime. Though not ranking with calcareous soils, they certainly show a very fair percentage of this constituent and probably at present quite sufficient for the best returns. There is no reason to suppose that the herbage would be deficient in this element or that cattle and horses grazed thereon would be lacking in bone-forming elements. Evidently the lime is not altogether in what might be termed a locked up condition, the percentage available being large. The ratio of the available to the total lime is the same for both soils.

Irrigated and Non-irrigated Soils.

The chief object in examining soils from Plots 3 and 4 was to ascertain what effect irrigation might have had upon the plant food present, sample No. 3 being from an unirrigated and No. 4 from an irrigated area.

In general appearance these samples are similar to Nos. 1 and 2—black loams of loose texture in which sand predominates. They both show a fair amount of fibre. No. 3 (not irrigated), is neutral to test paper ; No. 4 (irrigated), is very slightly alkaline.

The following deductions may be made from the chemical data : In 'total' potash the soils are alike ; in 'available' potash No. 4 is slightly the richer. In 'total' phosphoric acid, No. 3 is higher than No. 4, but the amount of this element immediately available in the latter is four times that in No. 3. Whether the greater proportion of available potash and phosphoric acid in No. 4 soil may be due to irrigation is not by any means clear, but the fact is worthy of note and deserving of further investigation. In nitrogen the percentages are almost identical. The irrigated soil (No. 4) shows a somewhat larger amount of lime, which may be due to the deposition of lime from the irrigation water, or more possibly brought up from the lower soil by capillarity induced by increased surface evaporation consequent upon irrigation. It will be noticed that the ratio of the 'available' lime to the 'total' lime is practically the same for both soils.

These, like Nos. 1 and 2, are soils of more than average fertility. Though not so heavy as the wheat lands of the prairie further east, they will undoubtedly give excellent yields, providing the climatic conditions, under which term we may include the water supply, are propitious.

NOVA SCOTIA.

From Annapolis county.—A sample of soil representative of much in the vicinity of Annapolis was submitted to us for examination and report. Messrs. T. S. and R. R. Bohaker, of Granville Ferry, N.S., in forwarding the soil say : 'We have several orchards planted on soil similar to the sample sent and they have not given us entire satisfaction for several years past. We are desirous of knowing what element is lacking, so that we may supply the deficiency and get the trees into better bearing. Would salt or lime be of value to this soil, and if so, in what quantity should they be applied? What other manures or fertilizers would you recommend ? Information on these points should be useful to a number of people in our neighbourhood.' This soil in the air-dried condition presents the appearance of a brownish-red, sandy loam. Its analysis shows it to be of much better quality than might be supposed from a casual inspection. The data are as follows :—

Analysis of Soil (air-dried).

Moisture	2·97
Organic and volatile matter	15·22
Mineral matter insoluble in acid	68·28
Lime	·26
Magnesia	·50
Oxide of iron and alumina	12·44
Silica (soluble)	·09
Phosphoric acid	·25
Potash	·37
	100·00
Nitrogen, in organic matter	·491

In potash, phosphoric acid and nitrogen, the foregoing data show it to be equal to the average fertile soil. Provided the season were favourable, especially as regards moisture, it should prove quite productive. It is to be remarked, however, that this soil has a decided acid reaction, and shows a deficiency in lime. This condition may account in a large measure for the poor returns spoken of by Messrs. Bohaker, for it has been abundantly demonstrated of late years that a sour condition, which is always associated with traces only of available lime compounds, is strongly detrimental to farm crops in general. An application of 30 to 40 bushels of lime per acre is, therefore, suggested as likely to bring about a more productive condition of the soil.

Since the soil contains but little clay, and consequently has a low absorptive capacity for moisture, it would be important from time to time that it should be replenished with organic matter, either by an application of manure or a green crop, such as clover, turned under. For maintaining the humus and nitrogen of orchard soil, there is, perhaps, no better or more economical plan than sowing clover in July and ploughing under during May of the following year, after which cultivation, to preserve a dry earth mulch, and thus prevent surface evaporation, should be practised until the clover is again sown. For field crops which allow of soil cultivation, such as corn and roots, this mechanical method for retaining soil moisture should not be neglected.

To enhance fertility by means of commercial fertilizers, we would suggest for the orchard and fruit trees generally a brand containing, say, 2 to 3 per cent nitrogen, 6 to 8 per cent available phosphoric acid, and 8 to 10 per cent potash—the application being from 300 to 500 pounds per acre. If it is desired to purchase these constituents separately, phosphoric acid may possibly be best applied as Thomas (Basic) slag. This fertilizer contains usually from 14 to 17 per cent of phosphoric acid, which, though present in a form not so immediately available as that in superphosphate, is better adapted to sour soils by reason of its alkalinity. Basic slag contains some 15 per cent of free lime, and hence neutralizes or counteracts acidity. The application may be 300 pounds per acre. Finely ground bone meal is also a good source of phosphoric acid for moist, warm soils of good texture. For potash, if wood ashes are not procurable, muriate of potash or kainit may be employed. Of muriate, 100 pounds per acre, and of kainit, 400 pounds per acre, is the usual dressing. Being an acid soil, nitrate of soda would be better than sulphate of ammonia to use as a source of nitrogen. The application may be from 100 to 150 pounds per acre, broadcasted in two or three dressings, say, of 50 pounds each, at intervals throughout the growing season. The nitrate can be mixed with several times its weight of dry loam to facilitate distribution.

For light and sandy soil, spring application of fertilizer is preferable, being spread on the ploughed land and lightly harrowed in. When nitrate of soda is used, it is furnished while vegetative growth is active, as already indicated.

CONSERVATION OF SOIL MOISTURE.

Experiments at Brandon, Man., and Indian Head, N.W.T.

We may, I think, confidently assert that among the problems to be solved in connection with agriculture in Manitoba and the North-west Territories that which seeks to secure and retain soil moisture for the use of the growing crop, is one of the most important. As yet, the necessity of returning plant food in manures and fertilizers is not generally felt, so rich is the soil over very large areas; but nevertheless there are elements, largely variable and uncertain, that have a most marked effect upon the yield. These elements or factors are chiefly two—rainfall and early frost. It is with the first of these, or rather the retention of the rain, that our present research has to do. The wheat yield of any year depends, as we well know, to a very large extent upon the climatic influences that have prevailed throughout the season—and to a certain degree upon those of the preceding season.

The value of a moist seed bed for the germinating grain and an ample precipitation during May and June, is well known to all farmers in the North-west. This becomes the more apparent when we remember that an acre of wheat requires more than 300 tons of water to bring it to perfection, and that especially is the moisture necessary during the earlier stages of the wheat's growth.

Now, though it is obviously impossible for the farmer to control the rainfall, it is quite practicable and within his power, by proper methods of culture, to store up a large portion of the season's precipitation for the use of the crops of the succeeding year. To obtain data that might serve to corroborate this statement we commenced an investigation last spring on fallowed and cropped lands on the Experimental Farms at Indian Head, N.W.T., and Brandon, Man.

The plan of the investigation may be stated as follows :—Early in the spring on each of the farms two areas having as far as possible soil of a similar character were selected, the one (A) intended to be fallowed during the present season, and which had been cropped in 1899; the second area (B) to be cropped, but which had been fallowed in 1899. Samples from each of these areas were taken, month by month, from May to November inclusive, to two depths—the first (No. 1) representing the upper 8 inches; the second (No. 2), the depth from 8 to 16 inches. These samples, taken in special canisters, were immediately on collection forwarded to the laboratory. On their arrival each canister of soil was at once weighed and its contents thoroughly mixed, sampled, and the moisture determined in duplicate. From the average weight of the canister of water-free soil (obtained from the seven monthly determinations) and the percentage of moisture, the amounts of water in tons and pounds per acre were calculated. The canisters (2½ inches by 8 inches) used were very stout and open at both ends. In taking the samples they were thrust into the ground until level with the surface and then removed with the aid of a sharp spade, and covered with deep and close-fitting caps. To prevent any possible evaporation en route, 'electric' tape was used to cover the edge of the cap or lid where it fitted over the canister.

Before discussing the results obtained, it will be of interest to consider in outline the general conditions as regards rainfall that prevailed in 1899, as well as this year. Mr. Bedford, writing of the season of 1899 at Brandon, says: 'May was unusually wet and cloudy, with a low temperature, and seeding was frequently interrupted by rain. Rain was abundant during early June, followed by bright, warm weather later in the month. The temperature and rainfall during July and August was about normal. The fall months were unusually dry.' The total rainfall was 11¼ inches.

Regarding the season of 1900, Mr. Bedford says: 'There was no rainfall previous to May 11, the date when the first samples were taken, and the soil was exceptionally dry.' On May 26, he wrote: 'it still holds very dry here.' In a letter dated June 13, Mr. Bedford states: 'the weather has been exceedingly dry so far; in fact, we have had practically no rain of any value. This is very unusual with us, as our annual rains generally occur during the last half of May and the first two weeks of June. Our crops and suffering severely from the want of rain.' Under date of June 28, he says : 'It continues exceedingly dry here, and the grain has suffered terribly throughout the province.' On July 13, he writes: 'Between three and four inches of rain has fallen, and the soil is pretty well saturated. The wheat has improved somewhat, and there is a prospect of more than half a crop of coarse grain.' In a letter on August 14, he says: 'The rainfall during the past month has been 2·37 inches, which is unusually heavy for this time of the year.' Again on September 12, he says: 'The rainfall for the past month has been 5·34 inches, which is much heavier than we generally have at this season of the year.'

From the foreging, it is obvious that while the season of 1899 was characterized by a plentiful but normal precipitation, that of 1900 was exceptional and abnormal, it being exceedingly dry during the earlier months of the summer and more than usually wet during the middle and later months of summer.

The records from the Indian Head Farm show that in 1899 the rainfall was fairly normal, the total precipitation being 9·44 inches, of which 1·35 inches fell in May, and 5·34 inches in June.

Of the present season, Mr. Mackay records similar weather conditions to those already stated for Brandon. Thus, on May 8, he writes: 'The weather for the past three weeks has been very dry and warm, with high winds prevailing almost every day.' On June 8, he says: 'We are having very bad, windy weather, with no rain of any use,' and then in September he states: 'We are having unusually wet weather and the outlook for grain still unstacked is far from bright.' Speaking of the season as a whole, Mr. Mackay writes, November 28, as follows:—'The past season has not been an average one for the test. The weather was too dry in May and June, and then in July, August and September it was unusually wet, causing the soil in Plot B with the growing crop to become much more moist than it otherwise would.'

The treatment of the soils may be summarized in the following statement:—

Brandon, Plot A.—In fallow 1900, was ploughed June 7 to a depth of 7 inches, the surface was cultivated with harrows and scuffler sufficient to keep down the weeds during the balance of the season.

Plot B.—In crop 1900, was ploughed on May 12, and sown the same day, and the crop harvested August 24; the yield was 32½ bushels of oats per acre. It was not ploughed after harvesting.

Indian Head, Plot A.—In fallow 1900, ploughed 8 inches deep between April 17 and 25; cultivated 2 inches deep four times, once each in May, June, July and August.

Plot B.—In crop 1900, ploughed 6 inches deep between June 1 and 15, 1899, cultivated 3 inches deep 3 times during July and August of that year, ploughed end of August 6 inches deep, but not ploughed or cultivated before seeding this year. Seed sown April 30. Grain harvested August 14, 1900.

The rainfall during the investigation, at Brandon and Indian Head, is tabulated as follows:—

Brandon, Man.	Inches.	Indian Head, N.W.T.	Inches.
May 11 to June 11	0·14	May 8 to June 8	1·08
June 11 to July 11	4·46	June 8 to July 8	1·85
July 11 to Aug. 11	2·37	July 8 to Aug. 8	2·44
Aug. 11 to Sep. 11	5·34	Aug. 8 to Sep. 8	2·83
Sep. 11 to Oct. 11	4·15	Sep. 8 to Oct. 8	3·81
Oct. 11 to Nov. 11	0·32	Oct. 8 to Nov. 8	0·10
Total	16·76	Total	12·11
NOTE.—There was no rainfall previous to May 11.		NOTE—The rainfall previous to May 8 was 0·27 inches.	

TABLE I.—MOISTURE: Percentage and Amount per Acre:—In Soils at Brandon and Indian Head, 1900.

BRANDON, MANITOBA.

Date of Collection.	"A." In Fallow, 1900. In Crop, 1899. No. 1. (1 to 8 ins.) Moisture. p. c.	Amount Per Acre.	No. 2. (8 to 16 ins.) Moisture. p. c.	Amount Per Acre.	"B." In Crop, 1900. In Fallow, 1899. No. 1. (1 to 8 ins.) Moisture. p. c.	Amount Per Acre.	No. 2. (8 to 16 ins.) Moisture. p. c.	Amount Per Acre.
1900.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs		Tons. Lbs.
May 11..	19·45	214 877	18·24	212 1780	25·55	325 216	22·92	301 1470
June 11..	17·40	187 247	18·30	231 106	20·63	246 519	23·00	303 286
July 11..	25·88	310 366	22·35	296 1896	26·80	366 161	23·27	307 1579
Aug. 11..	26·73	325 497	23·62	319 107	22·38	273 305	12·72	167 260
Sept. 11..	27·47	335 1335	21·62	285 1649	27·79	364 1323	21·31	274 1685
Oct. 11..	25·40	302 878	20·68	269 139	26·73	345 1329	20·54	262 622
Nov. 11..	27·43	335 1054	23·79	320 862	25·65	326 1597	20·96	280 184

INDIAN HEAD, N. W. T.

Date of Collection.	"A." In Fallow, 1900. In Crop, 1899. No. 1. (1 to 8 ins.) Moisture. p. c.	Amount Per Acre.	No. 2. (8 to 16 ins.) Moisture. p. c.	Amount Per Acre.	"B." In Crop, 1900. In Fallow, 1899. No. 1. (1 to 8 ins.) Moisture. p. c.	Amount Per Acre.	No. 2. (8 to 16 ins.) Moisture. p. c.	Amount Per Acre.
1900.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.
May 8...	22·03	264 260	21·32	276 1627	25·87	385 1320	25·55	324 1371
June 8...	23·52	287 1028	17·81	219 1860	26·76	341 37	26·68	344 513
July 8...	24·39	301 1188	22·38	292 1166	23·62	288 1281	18·35	212 1217
Aug. 8...	24·78	307 1860	19·28	242 916	25·05	311 1745	19·07	222 1774
Sept. 8...	24·16	297 1585	21·65	280 948	21·28	252 628	20·50	243 1732
Oct. 8...	25·26	315 1912	22·39	292 1729	27·60	355 1605	22·07	267 1886
Nov. 8...	25·79	324 1652	22·83	300 654	26·14	330 353	23·35	288 436

TABLE II.—MOISTURE:—Amount per Acre to depth of 16 inches.

Date.	Brandon, Man.				Date.	Indian Head, N.W.T.			
	A. Fallowed, 1900. Cropped, 1899.		B. Cropped, 1900. Fallowed, 1899.			A. Fallowed, 1900. Cropped, 1899.		B. Cropped, 1900. Fallowed, 1899.	
1960.	Tons.	lbs.	Tons.	lbs.	1900.	Tons.	lbs.	Tons.	lbs.
May 11.	427	657	626	1,686	May 8	540	1,887	700	691
June 11.	418	353	749	805	June 8	507	888	685	550
July 11	607	1,262	673	1,740	July 8	594	354	501	498
Aug. 11	644	604	440	565	Aug. 8	550	776	534	519
Sept. 11	621	984	639	1,008	Sept. 8	578	533	496	360
Oct. 11	571	1,017	607	1,951	Oct. 8	608	1,641	623	1,491
Nov. 11	655	1,916	606	1,781	Nov. 8	625	306	618	789

Considering first the data obtained on the Brandon soils, it is to be noticed that the soil in fallow last year (B) contained, during May, June, and July of the present year, both in the first and second eight inches more moisture than soil to corresponding depth from the area that was cropped last year. This will be more apparent by consulting Table II., from which the following results are obtained :—

	Tons.	Lbs.
May 11, 1900, excess of moisture in land fallowed, 1899, per acre	199	1,029
June 11, 1900, excess of moisture in land fallowed, 1899, per acre	331	452
July 11, 1900, excess of moisture in land fallowed, 1899, per acre	66	478

Between June 11, and July 11, the large excess of moisture previously present in soil (B) fell off rapidly, and was reduced to between 60 and 70 tons per acre. This in all probability was due to two causes ; the first, the greater absorptive and retentive power of soil (A)—in fallow 1900—to hold the rainfall of the month 4·46 inches (see table), and secondly, the large moisture requirements of the growing crop on soil (B). These factors continued evidently in a more marked manner from July 11, and August 11, so that at the latter date a reversal of the previous conditions had taken place and the soil in plot A now contained 204 tons moisture more than that in plot B. The draught by the growing grain on the moisture on this latter plot would be at its maximum this month—a fact that well explains our results.

Leaving out of consideration the data of plot A for October—regarding which we cannot at present offer any explanation—it will be observed that there is a constant tendency for the soil moisture in both fallowed and cropped soil during the latter months of the experiment to approximate. This is evidently due to the unusual wet autumn (see table of rainfall), the evaporation being slight. However, results show that on November 11, when the last samples were collected, the fallowed soil contained about 50 tons of moisture per acre more than in the cropped soil, the evaporation from the latter naturally being greater. Under more normal conditions we might, judging from our early results, expect a much larger excess of moisture in the fallowed soil.

Turning to the Indian Head samples, we find a similar condition during the early months of the season as at Brandon. Thus, the moisture in the fallowed land of 1899, over and above that of cropped land of that year was as follows :—

	Tons.	Lbs.
May 8, 1900, excess of moisture in fallowed land of 1899........	159	804
June 8, 1900, excess of moisture in fallowed land of 1899......	177	662

The July analyses give data in the same direction as those of August for Brandon, namely, less moisture in soil B (cropped 1900). The causes, we may suppose, are the same as those already indicated as exerting an effect at Brandon, the lighter rainfall at Indian Head accounting for the earlier appearance of the deficiency in soil moisture in the cropped land. This condition continued to prevail throughout July, August, and September, as seen by consulting Table II., from which the subjoined data are calculated :—

	Tons.	Lbs.
July 8, 1900, excess of moisture in fallowed land of 1900, per acre.......	92	1,859
August 8, 1900, excess of moisture in fallowed land of 1900, per acre......	16	257
September 8, 1900, excess of moisture in fallowed land of 1900, per acre.....	82	173

During the last two months of collection, the moistures in the cropped and fallowed soils, as in the case of the soils at Brandon, tend to approximate, but showing in the last determination, as also observed in the Brandon soils, a slight excess of moisture in the land fallowed during the present year.

The foregoing are without doubt most instructive and valuable data. The season, especially the earlier part, was a particularly favourable one for the investigation ; the drought that prevailed during the spring and early summer months emphasizing in a most marked manner the beneficial effect of the previous year's fallowing. It is exceedingly satisfactory to note that the results at both points of observation are in so large a measure confirmatory of one another, and that they afford such strong evidence of the value of fallowing as a means of storing up moisture for the crop of the succeeding year.

Further work another season when climatic conditions of a more normal character prevail, must be done. In addition to a repetition of the tests here presented, it is proposed to include the determination of moisture in soil growing the second crop after fallow, for it seems the practice of sowing grain on stubble land—quite a common one—often results in failure when the rainfall of the season is light.

NITRIFICATION IN NORTH-WEST SOILS.

Nitrification is the term applied to the process whereby the organic nitrogen of the soil is converted into nitrates—compounds which are the source of available nitrogen to crops. It is carried on in the soil by certain germs or micro-organisms which flourish on the humus or nitrogenous vegetable matter, providing conditions of warmth and moisture are favourable and a salifiable base, as lime, is present.

The warm, moist months of summer is when nitrification goes on most rapidly. But it is, nevertheless, essential to the best results that the growing grain should have access to an ample supply of this soluble nitrogenous food at a period in the spring or early summer, when frequently nitrification is but tardy. During such a period, the young plants must rely largely on the nitrates produced the previous season. Unfortunately for the agriculturist, nitrates are extremely soluble compounds and consequently are washed down out of the reach of the roots of the young plants, if heavy rains have prevailed the previous autumn or winter.

On the supposition that there was excessive leaching of the nitrates from the surface soil in the North-west during the autumn and winter months, it has been suggested by an English agricultural writer that an application of nitrate of soda in the spring to the growing grain would be of much value and greatly increase the yield. While this may be true in part in certain, what we may term, exceptional seasons, as the past one—which was characterized by a heavy rainfall in the late summer months—it is not, in all probability, the case usually, for in Manitoba and the North-west Territories the rains of the year, as a rule, are during the latter part of May and in June, and the autumn is fair and dry. Further, the winters are usually very cold and dry, and consequently not conducive to leaching. To this we may add, the soils generally over the wheat-growing areas are a heavy clay loam of a retentive character.

Be this as it may, it was thought desirable to determine from month to month the amount of nitrates in the surface soils (1 to 8 inches) already referred to as examined for their moisture content. The method adopted was to weigh out 100 grams of the fresh soil and add thereto 1,000 c.c. of ammonia-free distilled water and shake the mixture well for one hour. It was then allowed to settle for one hour and the free ammonia in an aliquot part at once determined. A further quantity was at the same time set aside in contact with a zinc-copper couple (by means of which nitrates are reduced to ammonia) and at the expiration of twenty-four hours distilled. From the free ammonia in the distillate the amount previously found deducted and the remainder calculated to nitrogen, and recorded as nitrogen in nitrates in one million parts of the water-free soil. The results are set forth in the subjoined table :—

NITROGEN in Nitrates and Nitrites—Results recorded in parts per million of water-free soil.

Date.	Brandon, Man.		Date.	Indian Head, N.W.T.	
	In Fallow, 1900. In Crop, 1899.	In Crop, 1900. In Fallow, 1899.		In Fallow, 1900. In Crop, 1899.	In Crop, 1900. In Fallow, 1899.
1900.			1900.		
May 11........	10·62	11·45	May 8........	3·37	16·22
June 11........	15·21	28·20	June 8........	6·93	25·70
July 11........	10·99	7·65	July 8........	22·30	20·00
Aug. 11........	17·94	8·42	Aug. 8........	22·70	17·20
Sept. 11........	10·67	5·51	Sept. 8........	16·71	7·20
Oct. 11........	4·55	7·91	Oct. 8........	12·20	7·32
Nov. 11........	2·53	6·40	Nov. 8........	3·99	3·97

In considering the foregoing data, it would be well to keep constantly in mind that in two very important features the season of 1900 was abnormal in the North-west—an unusual drought in early summer and an exceptionally heavy rainfall in the autumn months. Under these conditions, we may suppose the loss of nitrates during the late autumn was greater than is ordinarily the case.

Brandon.—Soil in fallow 1900. With certain minor fluctuations, which I think may be accounted for in a large measure by the rainfall, the amount of nitrates keeps up until the early part of September, when it rapidly falls, evidently owing to the heavy rains already referred to, which washed the nitrates beneath the first 8 inches of soil. It has already been remarked that the season of 1899 was more or less normal in character, and it is probably from this fact that the soil in May possessed such a fair amount of nitrates. The largest amount was obtained in the sample taken August 11, no doubt due chiefly to the moisture that fell the preceding month promoting the nitrification process.

On the soil cropped in 1900 we find, as might be expected, a falling-off after the June sample was collected, due undoubtedly to the wheat crop making its draught upon this nitrogenous food.

Indian Head.—Soil in fallow 1900. This soil, probably owing to a very favourable physical condition, gave large amounts of nitrates throughout the summer, but these, as in the case of the Brandon soils, rapidly fell off during October from the cause we have advanced.

Soil in crop 1900. The soil, similarly, was richer in nitrates than the corresponding Brandon sample, but in a general way showed the same falling-off as the season advanced, due to the crop's requirements.

It is to be confessed that the present investigation gives support to the view that the nitrates are largely lost to the surface soil during the late autumn months, but whether this occurs in normal seasons to the extent here indicated is very doubtful. Further work is necessary to determine this point. It seems clear, however, that fallowing encourages the development of the nitrates.

FERTILIZERS.

MARL.

This material consists essentially of carbonate of lime, but considerable amounts of organic matter, sand and clay, frequently are present. It occurs in beds of varying thicknesses in old lake and pond bottoms, and on the margins of many existing bodies of water, showing their former extension. Usually it is overlaid with peat or swamp muck. It has arisen from the breaking down of countless fresh-water shells, many of which, however, still retain their form, and thus give the name shell marl to the deposit. It is very widely distributed in Canada, samples from beds of marl from almost every large area in the Dominion having been examined in our laboratories. The better and purer marls of Ontario are now being largely used for cement-making.

Considered agriculturally, marl must be regarded rather as an amendment than a fertilizer ; improving the tilth, neutralizing acidity and promoting nitrification, are amongst its chief functions, though it has a distinct value as a supplier of lime (an element of plant food) for soils deficient in that constituent.

The application of marl is especially to be recommended for heavy, plastic clays, for very light soils deficient in lime, and for those in which humus predominates. It renders the tilth of the former mellower, allowing air to permeate the soil and the roots to spread more easily ; its addition improves sandy soils, by making them heavier and more retentive of moisture and fertilizing materials. In the slow oxidation of the organic matter of peaty soils, it aids in the conversion of their nitrogen into forms which can be taken up as food by plants. This beneficial process is brought about by certain microscopic plants in the soil, known as the ferments of nitrification, the development of which is greatly encouraged by the presence of carbonate of lime. To all soils deficient in lime, as we have said, it may advantageously be applied, furnishing thereby not only plant food, but also setting free in the soil the inactive stores of mineral matter, so that such may be assimilable by vegetation. Lime in all its forms has proved of special value as a manure for the leguminosæ—of which pease, beans, &c., are important members.

A good marl for agricultural purposes should be of a light colour, and not of a hard or flinty nature. It should easily disintegrate or break down on exposure to the weather, allowing a ready mixture with the soil.

New Brunswick.—Two samples, from the upper and lower layers of the deposit, have been received from Dawsonville. The upper and darker layer was a mixture of muck (decayed vegetable matter) and marl ; the lower layer of a light-gray colour, proved to be entirely composed of shell marl. This latter sample was submitted to analysis, with the following results :—

Moisture	68·91
Organic and volatile matter	4·66
Carbonate of lime	21·90
Oxide of iron and alumina	·87
Clay, sand, &c	2·56
Magnesia, &c., by difference	1·10
	100·00

This is a very good marl. If piled and allowed to dry out, a saving could be effected in connection with its hauling. Simply drying by exposure would result in a marl containing from 60 to 70 per cent of carbonate of lime.

Specimens of marl from the Macdonald beds, Restigouche, have also been recently examined by us. The samples were forwarded by Mr. John McAllister, M.P., Campbellton, N.B. :—

	No. 1. Surface.	No 2. 15 feet below Surface.
Insoluble rock matter	15·03 p.c.	75·05 p.c.

No. 1 is a marl of very fair quality.

No. 2 is very poor and of very little value agriculturally, owing to the large excess of inert material.

Nova Scotia.—In many districts where the soil is deficient in active lime, and where deposits of marl to supply this deficiency are not available, it frequently becomes of importance to farmers to learn if lime can be obtained by burning the rock of the neighbourhood. In this connection the following letter and analysis will be of interest. Mr. James W. Stairs, of Halifax, writing under date of June 11, 1900, says :—'I send you two samples of limestone from Meagher's Grant, Musquodoboit, Halifax county. Will you please analyse them and let me know if they will furnish lime fit for farming purposes ? There is a large mass of it, and if on burning we can obtain good lime, we shall be able to furnish our farms with a much needed constituent. There must be hundreds of thousands of tons in the deposit ; it extends over a large tract of country.'

Our analysis and report is subjoined :—

	Large Specimen.	Small Specimen.
Carbonate of lime	53·92	52·08
Carbonate of magnesia	39·23	39·90
Oxide of iron and alumina	....	4·06
Insoluble rock matter	3·24	2·06

For all practical purposes, these samples may be considered identical. They are not true limestone, but that variety known as magnesian or dolomitic limestone. Owing to the presence of the carbonate of magnesia, a 'fat' lime cannot be obtained on burning this rock—it can only furnish 'poor' lime, that is, one that slakes badly. This fact, however, should not deter farmers from burning this limestone when their soil is in need of lime. We have no doubt it will yield, when well burnt, a most useful fertilizer for all such soils.

Island of Anticosti.—A very large deposit of marl, probably 150 acres in extent and of unknown depth, exists at Ellis Bay, Lake Mignon, which is about one-third of a mile in the interior of the island. Having received a request for an examination and report on this material as a fertilizer from M. Comettant, Governor of the island, we submitted a sample to analysis with the following results :—

Analysis of (air-dried) Marl.

	Per cent.
Moisture	2·65
Vegetable and organic matter	13·87
Sand and clay	25·78
Oxide of iron and alumina	2·93
Carbonate of lime	52·52
Phosphoric acid	Traces.
Potash	·42

We reported on this marl in the following terms :—

These data show this material to be marl of fair quality. Judging from its composition, as well as from its mechanical condition, it should prove a valuable amendment for all sour, peaty and heavy clay soils, as well as for all soils deficient in lime.

Phosphoric acid is present only in traces, and the percentage of potash is not larger than that in many soils of good average fertility. From these facts it is clear that this substance cannot be used as a substitute for fertilizers supplying these elements of plant food.

The proportion of semi-decayed vegetable matter (humus) present slightly enhances the value of the marl, more especially if it is to be applied to light soils, poor in organic matter.

GYPSUM OR LAND PLASTER.

Among the naturally-occurring fertilizers of Canada, gypsum or land plaster must be considered as one of the most valuable and important. As, however, it does not contain either nitrogen, potash or phosphoric acid, it is not in any sense comparable to commercial fertilizers, the value of which lies in the percentages of these constituents they contain. Gypsum is sulphate of lime* and, therefore, as a direct supplier of plant food can only furnish sulphur and lime; but as an indirect ferti-

*Pure gypsum is composed of lime 32·5 per cent, sulphuric acid 46·5 per cent, and water 21·0 per cent ($CaSO_4$, $2H_2O$.)

lizer it has an additional value in liberating in an available form potash from its locked-up stores (the double silicates) in the soil. It may, therefore, in a sense be considered a potassic fertilizer. For this reason especially, it has been found of benefit for leguminous crops, such as clover, beans and pease, plants which respond readily to treatment with potash. As a manure for turnips, Indian corn and many leafy crops, it has also been used profitably, as well as for top-dressing grass lands, in which it encourages the growth of the clovers. Very poor soils give but little return, as a rule, from a dressing of gypsum—on such it must be supplemented by a more complete manure—but on rich soils and with the afore-mentioned crops it is wont to give an immediate return.

From an agricultural stand-point, however, one of the most valuable properties of this material is that of 'fixing' or retaining ammonia. Rather than apply it directly to the soil, we, therefore, advise its use as an absorbent in the stable and cow-house, where, sprinkled on the floor, it will prevent the loss of ammonia from the fermenting urine. Thus, the atmosphere of these buildings is rendered more wholesome for the farm animals, and the manure made more valuable. A sample of gypsum sent by Mr. J. R. Mosher, Kempt Shore, N.S., and recently analysed by us, afforded the following data :—

	Per cent.
Insoluble rock matter	2·99
Calcium sulphate (gypsum)	91·80
Undetermined mineral constituents	5·21
	100·00

It is evidently a very good sample.

Former analyses of samples from Nova Scotia made in the Farm Laboratories may be tabulated as follows:—

	A.	B.
Insoluble rock matter	15·85	·48
Calcium sulphate (gypsum)	68·65	97·53
Oxide of iron and alumina	3·91	Traces.
Calcium carbonate	4·98	....
Magnesium carbonate, &c. (undetermined)	6·61	1·99
	100·00	100·00

Gypsum occurs in Canada, essentially, in large irregular masses, from a few yards to one-quarter of a mile in extent, and from 5 to 8 feet in thickness.

In Ontario, it is more especially found in large lenticular masses, interstratified with dolomitic rocks, in the vicinity of Paris and along the Grand River, between Paris and Cayuga. It is also quarried in large quantities in New Brunswick and Nova Scotia, occurring in vast deposits near Hillsboro,' Petitcodiac, along the Tobique River, N.B., and at Wentworth and Montague, in Hants county, and other places in Nova Scotia.

WOOD ASHES.

Attention has frequently been directed to this home-produced fertilizer, more particularly as a source of potash, and analyses of samples collected in various parts have from time to time appeared in our reports. The composition of wood ashes must necessarily be somewhat variable, but there are limits within which all genuine unleached ashes should be found. Exposure and leaching will lower the percentage of potash and increase the proportion of water, while careless collection or the intentional addition of sand or other inert matter will further lessen their value. For these reasons it would, therefore, be advisable to purchase only on guaranteed analysis.

Since wood ashes sell for less than $10 per ton, their examination is not made with that of other fertilizers by the Inland Revenue Department, under the Fertilizer Act. This fact furnishes an additional reason for the necessity of farmers and orchardists, when purchasing car lots, insisting on a certified statement as to the fertilizing value of the ashes, or else taking a representative sample and having it submitted to analysis by a chemist of repute.

We are not of the opinion that there is much intentional adulteration in Canada, but it is certainly true that occasionally very poor samples have been received by us from correspondents. A notable case, illustrating this fact, is the following:—In May of the current year, a correspondent in Waterville, N.S., asked us to examine a sample of ashes from a carload which he and other farmers were buying together. Though such an examination does not come within the regular scope of our work, the circumstances as stated seemed, on investigation, to warrant us in making an exception, and the analysis was made. The data are as follows:—

	Per cent.
Moisture	26·93
Insoluble mineral matter	5·82
Potash	2·59
Phosphoric acid	·74

These figures should be compared with the subjoined, which are the averages obtained by the Massachusetts Experiment Station from the analysis of 476 samples of Canadian hardwood ashes, sold in that state :

	Per cent.
Moisture	10·64
Insoluble mineral matter	14·22
Potash	5·37
Phosphoric acid	1·52

In our laboratories we have found a variation in apparently genuine samples from 5 to 12 per cent potash, and we are of the opinion that good, unleached ashes do not, as a rule, fall below 5·5 per cent potash. It is obvious, therefore, in the case under consideration that a loss of approximately 50 per cent of potash had taken place by exposure or by intentional leaching. In other words, valuing the potash at 6c. per pound, a ton of ashes analysing 5½ per cent potash would be worth for potash alone $6.60, while the Waterville sample would only be worth $3.11 per ton. It is evident from this consideration that the question of composition is worthy of attention on the part of those who purchase this fertilizer.

WOOL WASTE.

As pointed out in our report for 1890, this material has frequently a notable value as a fertilizer from the amounts of nitrogen and potash it contains. Thus, in a sample then analysed, we found 1·31 per cent nitrogen, and 3·56 per cent potash. That this waste product, however, is quite variable will be obvious on comparing these data with those about to be given, and which have recently been obtained on the analysis of a sample from the Oxford Mills, N.S.

Analysis of Wool Waste, Oxford Mills, N.S.

	Per cent.
Moisture	6·90
Ash or mineral matter	10·86
Mineral matter insoluble in acid	8·50
Phosphoric acid	0·09
Potash	0·26
Nitrogen	4·38

The amounts of phosphoric acid and potash are so small that they may be disregarded, the only fertilizing element of value present being nitrogen. This exists to the extent of 87 pounds per ton. Since the nitrogen in wool waste is not a condition assimilable by plants, it becomes necessary, or at any rate advisable, to submit the material to fermentation, as in the compost heap, before application to the soil. To this end it may be mixed with wood ashes or lime, or composted with actively fermenting manure. The sample under comment was found to contain 31·15 per cent of oil or fat. This would prevent the ready decomposition of the waste and certainly reduce very much its fertilizing value. The amount of oil is so large that one is prompted to predict its economic recovery would be quite practicable.

FODDERS AND FEEDING STUFFS.

Our investigation relating to the composition of Canadian forage crops and feeding stuffs has included during the past year certain leguminous plants and grasses grown in the experimental plots under the direction of Dr. Fletcher, several varieties of mangels, carrots, turnips and sugar beets from the crops of 1900, rape at various periods of growth furnished by the Agricultural Division, besides many feeding stuffs of which samples have been received for analysis.

The value of a cattle food, from the feeding standpoint, depends upon its composition and digestibility. It becomes, therefore, important to have some knowledge of the character of a fodder's constituents and of the functions of those constituents in the animal system. We consequently in the following paragraphs, explain in brief these matters, and thus afford information that will be of assistance in understanding the data detailed in tables of analyses.

Water.—The percentage of water present depends upon the nature of the fodder. In roots there is about 90 per cent; in green fodders, e.g., corn and grass, there is usually between 70 per cent and 80 per cent, according to variety, time of year, &c.; in hay we find about 14 per cent, and in cornmeal, oil-cake, and milling products generally, between 7 per cent and 12 per cent.

Although water is as necessary to the animal as it is to the plant, yet on account of its abundance in nature no value can be assigned to it in fodders. It must not be forgotten, however, that succulency, a most important quality, influencing greatly both the palatability and digestibility of a food, is due chiefly to the presence of the natural or original water. It is succulency that gives to many green fodders a value, as for milk production, above that apparently indicated by their composition.

During the maturing of many foliaceous plants, such as grass, Indian corn, &c., the withdrawal of water, accompanied by other changes, tends to lower somewhat the digestibility and hence the value of some of the constituents. Hence some plants may be more nutritious in their green and succulent state than they are when ripe and dry, in spite of the fact that in the latter condition the solid food materials may largely exceed that found in the green and immature fodder.

Fat.—Of the non-nitrogenous constituents, fat has the highest nutritive value; and this chiefly because it contains a larger percentage of carbon than fibre, or the carbohydrates, in the burning of which in the blood much heat is evolved. By its combustion, fat generates the greater part of the heat of the body. Its high value is largely due, also, to the fact that it can be transformed into fatty tissue of the animal much more readily than the other organic ingredients. It aids the digestion and assimilation of the albuminoids and preserves them from undue waste.

Fibre—Is the least valuable of the food ingredients. It is the part of plants that in part corresponds in function to that of the bones of animals, viz., the supporting and strengthening of the other tissues. By chemical means it can be separated from the other parts of a fodder as a fibrous or woody material. As plants mature, the fibre, as a rule, becomes less digestible, chiefly owing to the deposition of ligneous or woody matter. In composition and function, fibre is similar to the 'Nitrogen-free extract.'

Nitrogen-free Extract or Carbo-hydrates.—Under these terms are included starch, sugars and many allied substances forming, usually, the larger part of the dry matter of a fodder. Their function in the animal economy is to produce heat and energy, though under certain circumstances they may become a source of fat.

Protein or Albuminoids.—These substances constitute the nitrogenous portion of the fodder. They are certainly the most important and most valuable of all the nutritive ingredients, for in the animal economy they alone can play the part of flesh producers, entering into the composition of muscle and cartilage and bone and furnishing essential constituents for the vital fluids—blood and milk. They may also serve in the production of fat, and in the development of heat and energy.

Ash or Mineral Matter—Is that part left when a fodder in the course of analysis is burned, an operation that destroys and dissipates the organic matter. It is composed chiefly of lime, magnesia, potash and soda, combined with phosphoric, hydrochloric and silicic acids. The functions of these materials in the animal are to assist in the formation of bone (largely composed of phosphate of lime) and to furnish that small quantity of mineral matter found in all animal tissues. It also replaces those saline substances daily excreted.

THE CHEMISTRY OF RAPE.

During the past few years the growing of rape—a plant which, as far as Canada is concerned, may be considered a newly introduced fodder—has been receiving increased attention from our farmers. In certain districts it is now largely used as a forage crop for sheep, swine and steers, and undoubtedly still larger areas in the future will be sown for this purpose. It seemed desirable, therefore, that we should determine by analysis the food value of this plant, so that its true position as regards other coarse or forage crops could be arrived at, and, further, that we should ascertain what changes in its composition affecting its nutritive value take place as it advances towards maturity.

To this end, samples were collected from the rape crops on the Central Farm during the past season at several stages of the plant's growth and submitted to analysis. The variety grown was Dwarf Essex, and the seed was sown at the rate of 4 pounds per acre in drills 30 inches apart. The data are given in tabular form to facilitate comparison of the composition of the plant at different stages. In addition to analyses of the whole plant, an examination was made of the stalks and foliage, separately, of the somewhat mature rape plant.

ANALYSIS OF RAPE—C. E. FARM, 1900.

Number.	Date of Sowing.	Date of Collection.	Days of Growth.	Height of Plant.	Fresh Material.								Water-free Substance.						
					Water.	Fat.	Fibre.	Nitrogen free Extract.	Crude Protein.	Alb'd Nitrogen.	Non-Alb'd Nitrogen.	Ash.	Fat.	Fibre.	Nitrogen free Extract.	Crude Protein.	Alb'd Nitrogen.	Non-Alb'd Nitrogen.	Ash.
1	June 23..	July 24..	31 days...	12 in....	93·20	0·12	0·83	2·01	2·20	0·20	0·15	1·64	1·77	12·20	29·64	32·32	2·98	2·19	24·07
2	" 16..	" 24..	38 " ...	20 in....	93·80	0·11	1·02	2·00	1·75	0·16	0·12	1·32	1·75	16·51	32·29	28·19	2·57	1·93	21·26
3	May 19..	" 24..	66 " ...	31 in....	93·16	0·07	1·34	2·59	1·45	0·14	0·09	1·39	1·07	19·57	37·93	21·27	2·11	1·28	20·16
4	" 19..	Aug. 10..	83 " ...	34 in...	92·34	0·06	1·56	4·02	0·98	0·09	0·07	1·04	0·88	20·42	52·33	12·79	1·12	0·92	13·58
5	" 19..	" 24..	97 " ...	44 in....	89·86	0·09	2·48	4·69	1·35	0·13	0·09	1·53	0·89	24·44	46·28	13·33	1·30	0·84	15·06
6	" 19..	" 24..	97 " ...	44 in....	85 10	0·02	5·83	6·29	1·21	0·19	0·003	1·55	0·15	39·14	42·20	8·11	1·27	0·022	10·40
7	" 19..	" 24..	97 " ...	44 in....	90·75	0·14	1·77	4·32	1·51	0·14	0·098	1·51	1·52	19·14	46·72	16·28	1·54	1·06	16·34

NOTE.—Samples 1 to 5 inclusive consist of the whole plant minus the root, that is, of the stem and leaves. No. 6 consists of the stalk, and No. 7 of the leaves, taken from plants similar to those analysed as No. 5.

It is very evident from the large percentage of water present throughout the whole life of the plant that rape is to be classed as a succulent forage crop. For this reason (its high water content) it cannot be preserved in the silo, nor, on account of the crumbling to powder of its leaves on drying, can it be cured on the field. It is, therefore, consumed, either on the field or by soiling, by the animals as it grows, and thus all expense in harvesting saved.

Dry Matter.—Though the variation in the composition of the plant throughout its period of growth is not great, there is a well marked tendency in certain directions that we may call attention to. In the first place, it is to be noted that while there is not much change as regards water content during the earlier two months of growth, there is from that period on a gradual increase in the percentage of dry matter. Thus, in rape one month old we found 6·80 per cent dry matter, while in that three months old (when the whole plant was still edible), there was 10·14 per cent dry matter. It is apparent, therefore, that, judged from this consideration solely, the older plants, weight for weight, would have the greater fodder value. This increase in the amount of dry matter seems to be due principally to the larger proportion of stalk to foliage in the more mature rape. Thus, in Nos. 6 and 7 we have the composition in detail of the stalks and foliage respectively of plants of the same age as those recorded under No. 5. These show that the stalks contain approximately 5·5 per cent more dry matter than the foliage. After the plants have reached a certain and more advanced stage of growth this apparent benefit is, however, to some extent offset by the greater development of fibre in the stalks, making them hard and unpalatable, and to some degree no doubt less digestible. The foliage always contains much less fibre than the stalks.

The changes that take place in the composition of the dry matter during the period of growth are best understood from a study of the data recorded for the water-free substance.

Fat.—Usually a number of substances, of which chlorophyll is the chief, are included with the fat when employing the ordinary process employed for fat estimation. In the case of seeds, meals, and feeds of a similar character, no great error is introduced by such a determination (since from these materials the solvent takes nothing but fat), but in the case of green fodders the difference between the crude fat (including resins, gums and chlorophyll) and the true or pure fat or oil is frequently very large. Hence, we decided in these analyses to employ a discriminating method, and the figures given, therefore, represent true fat.

It would seem that the younger plants are the richer in fat, and this evidently in a large measure is due to the fact that the proportion of foliage to stalks is greater in them than in the more mature plant. This would probably not hold true to so great an extent in rape grown broadcast. The stalks (No. 6) are seen to contain but one-tenth the amount of the fat in the foliage (No. 7).

Fibre.—As might be expected, the percentage of this constituent increases with the age of the plant. The stalks are naturally more fibrous than the leaves (compare Nos. 6 and 7), and since they (the stalks) are more prominent as the season advances the analysis of the whole shows an increasing fibre content. In speaking of the relative development of stalk to leaf, it may be of interest to state that in the rape collected August 24, the proportion of stalk (taken from the ground to the base of the lowest leaf) to leaf was 1 to 4, by weight. In rape sown broadcast, the proportion of stalk would probably be much less.

Crude Protein.—This term is applied in a comprehensive sense and is used to include all the nitrogenous substances of the plant. In the case of seeds—including grains of all kinds and their milling products—this involves but little error, since practically all their nitrogen exists in the true albuminoid form. For such substances the amount of 'crude protein' is a true indicator of their food value for furnishing the nitrogenous portion of the ration, for it really stands for albuminoids, which, as already stated, are the most important of all food constituents in maintaining life and building up of the animal tissues. With green and immature fodders, however, the term 'crude protein' comprises not only the albuminoids, but also other nitrogenous substances (nitrates, amides, &c.), which, it may be remarked, have a very much lower feeding value—indeed, it is not probable that these compounds are a source of nitrogen to the animal system. In order to ascertain the proportion of these two forms of nitrogenous compounds and thus arrive at a more correct knowledge of the feeding value of rape at different periods of its growth, we determined the nitrogen present in the non-albuminoid compounds, as well as in the true albuminoids. A survey of the data will reveal that as the plant grows the proportion of the latter to the former increases, and, therefore, the nitrogenous matter of the older plants is more valuable from the food standpoint; in other words, the non-albuminoid nitrogenous substances tend to decrease with the growth of the plant. This statement, however, must be considered in connection with another fact, made equally clear by our data, namely, that as the season advances the rape shows a falling off of both the albuminoid and non-albuminoid nitrogen. Weight for weight, the younger plant is richer in both classes of these compounds than the older rape. This is due to the fact that the assimilation of nitrogen from the soil by the plant goes on more rapidly during the first month or six weeks of growth than later. The larger yield per acre obtained from a crop three months old compared with that of two months, very largely offsets this decline in the percentage of albuminoids, and no doubt makes it desirable from an economic standpoint in many instances to allow the crop to come to the more mature period, provided always that the plant is not becoming unpalatable from the development of hard and fibrous stalks.

Nitrogen-free Extract or Carbohydrates.—The percentage of nitrogen-free extract increases greatly in the fresh fodder, as well as in the dry matter, during the latter weeks of growth.

Ash or Mineral Matter.—A comparison of the percentages of this constituent in the dry matter makes it evident that it is more particularly during the earlier weeks of growth that the rape plant makes its greatest draught upon the available stores of mineral plant food in the soil.

To sum up the foregoing observations, we may conclude: (1) that the rape plant of four to six weeks old contains more water and less dry matter than that of three months; (2) that the *dry matter* of the younger plant is relatively richer in fat and albuminoids (protein) than that of the older rape; (3) that the non-albuminoid nitrogenous compounds decline as the season advances; (4) that the percentage of fibre increases with the age of the plant, due to the greater development of stalk; (5) that the nitrogen-free extract increases with the growth of the plant; (6) that the percentage of ash in the dry matter decreases as growth progresses. It would appear, therefore, that on the whole the *dry matter* of the six weeks old rape has a higher feeding value than that of rape of three months' growth, but that, owing to the increased percentage of dry matter in the mature plant and the much larger yield of crop obtained from the latter, the feeding value per acre at the more advanced period of growth is the greater. And this will probably be more emphasized in rape sown broadcast than in drills, as the proportion of stalk to foliage in the former will be less.

The fact that the assimilation of the soil plant food elements takes place chiefly during the first six weeks of growth points to the benefit to be derived from a thorough preparation of the soil.

Compared with other forage crops, rape, although it possesses a large percentage of water, takes a high place, owing to its, comparatively speaking, large percentage of nitrogenous constituents (albuminoids). In this respect it closely resembles clover and other legumes, which, for the same reason, are justly considered to have a feeding value above most of the grasses and root crops in general.

LEGUMES.

The leguminosæ, to which clover, pease, beans, vetches, &c., belong, are characterized by a high nitrogen content (protein), and consequently furnish fodder of greater feeding value than grasses, roots and many other forage plants. Several members of this family have from time to time been analysed in the Farm laboratories, and their composition published. (The reader is referred especially to the report of the Chemical Division for 1893). During the past summer further samples have been collected from the 'grass plots' of the farm and submitted to analysis. The data obtained are given in the following table :—

Analysis of Legumes—1900.

Samples were collected on July 4, 1900, when all the plants were in full flower.	Fresh Material.						Water-free Substance.				
	Water.	Fat.	Fibre.	Nitrogen—free Extract.	Crude Protein.	Ash.	Fat.	Fibre.	Nitrogen—free Extract.	Crude Protein.	Ash.
Wild Pea from North Bay... (Lathyrus maritimus.)	81 01	·24	5·35	7·63	4·22	1·55	1·28	28·19	40·14	22·22	8·17
Grass Pea.................... (Lathyrus sativus.)	87·06	·11	3·66	4·74	3·03	1.40	·84	28·29	36·60	23·44	10·83
Wagner's Wood Pea.......... (Lathyrus sylvestris Var Wagneri.)	83·66	·05	5·60	5·05	4·49	1·15	·31	34·25	30·94	27·45	7·0
Purple Tufted Vetch .... (Vicia Cracca.)	74·91	·12	7·20	10·20	5·49	2·08	·49	28·69	40·67	21·87	8·28

For the botanical information in the following paragraphs I am indebted to Dr. James Fletcher, Botanist of the Experimental Farms.

Wild Pea or Seaside Pea (*Lathyrus maritimus*), from North Bay.—A deep-rooted, free-growing and very persistent perennial, stout and succulent, somewhat fleshy leaves with 6 to 12 leaflets ; flowers, 6 to 10 inches long ; racemes, long, purple. Judging from the analysis, this plant should afford a rich fodder, and since it gives a large yield it is certainly worthy of trial. It is stated that cattle eat it with relish.

Grass Pea, Chickling Vetch (*Lathyrus sativus*).—An annual with a weak, winged stem, with solitary flowers and compound leaves of four long and narrow leaflets. A good fodder, either green or cured, especially for sheep, now extensively grown in western Ontario on account of the seed being exempt from the attack of the pea weevil. From the great length of its growing and flowering period, it should form an excellent soiling crop.

Wagner's Wood-pea (*Lathyrus sylvestris Wagneri*).—A fodder plant introduced a few years ago, receiving extensive advertising and stated to do well even on poor soils. It is a free-growing leafy pea. In its second year of growth at the Experimental Farm, Ottawa, it produced a thick mass of leafy stems, nearly 4 feet in height. Analysis shows it to be extremely rich in nitrogenous matter (protein). Though cattle do not first evince a liking for it, it is said by English writers that they soon eat it with relish, both in the green condition and as hay. On account of its high feeding value and the large yield per acre to be obtained, it may become an important addition to our present list of forage and soiling crops.

Purple-tufted Vetch (*Vicia Cracca*, L.).—A deep-rooted and very persistent perennial; leaves with about 20 leaflets; flowers, violet and blue, in clusters of about 30, but producing few good seeds; stems, slender, requiring some other plant, such as rye, to support them. It is much relished by stock, and undoubtedly is an excellent fodder. Of the four examined, this plant showed the highest amount of dry matter.

ROOTS.

In connection with a series of feeding trials with steers conducted by the Agricultural Division, it became of importance to learn the respective food values of certain roots. We accordingly submitted to analysis, from the crop of the present year, three varieties of mangels, two of carrots, three of turnips, and one of sugar-beets—the latter from the crop under (a) special culture, and (b) ordinary field culture. The information thus obtained will, it is hoped, prove of interest to all farmers and stock-raisers, for, as will be noticed, large differences in feeding value sometimes exist even between two varieties of the same class of roots.

Though in many parts of Canada the corn crop has to a very large extent displaced roots, there appear to be areas of considerable magnitude (as in the Maritime provinces) better adapted by reason of local climatic conditions to the growth of roots. But whether corn can or cannot be grown advantageously, should not alone decide the question as to the culture of roots. It is true that more feed per acre can be obtained from glazed corn than from roots—and that it furnishes feed which in a measure may replace the grain of the ration while at the same time acting as a succulent fodder. It is also true that roots contain a large percentage of water and that the 'dry-matter' is not rich in protein. Nevertheless, roots by reason of their ready and practically complete digestion, their succulent nature, and what may be termed their medicinal properties—due to their richness in saline matter—have been found by stock-feeders of long experience to be an exceedingly valuable constituent of the ration. It is probable that they aid materially in the digestion of the rest of the food, and no doubt also prove useful in the proper extension of the digestive apparatus. Roots are essentially non-nitrogenous, their dry matter having a wide nutritive ration (1 : 8 to 1 : 13), and consequently cannot be used economically, save as part of the ration.

ANALYSIS of Roots, Central Experimental Farm, Ottawa, 1900.

———	Fresh Material.							Water-free Substance.				
	Water.	Fat.	Fibre.	Nitrogen-free extract.	Crude Protein.	Ash.	Sugar in Juice.	Fat.	Fibre.	Nitrogen-free extract.	Crude Protein.	Ash.
Gate Post Mangel	88·86	·03	·85	8·64	·82	·80	6·15	·31	7·64	77·47	7·36	7·22
Giant Yellow Globe Mangel	91·81	·02	·69	5·24	1·24	1·00	2·64	·23	8·49	63·89	15·13	12·26
Golden Tankard Mangel	89·75	·03	·77	7·83	·82	·80	4·78	·32	7·53	76·32	8·00	7·83
Imp'd Short White Carrot	91·54	·07	·87	5·93	·83	·76	2·99	·81	10·41	69·90	9·86	9·02
Guerande or Ox-Heart Carrot	88·36	·14	·90	8·37	1·19	1·04	4·72	1·26	7·77	71·79	10·24	8·94
Skirvings Turnip	89·65	·01	1·17	7·48	1·03	·66	1·54	12	11·30	72·27	9·93	6·38
Champion Purple Top Turnip	89·23	·01	1·31	7·79	·85	·81	1·46	·12	12·19	72·32	7·88	7·49
Rennie's Prize " "	89·64	·004	1·17	7·45	1·07	·66	1·63	·04	11·33	71·94	10·30	6·39
Sugar Beet 'Ordinary Culture'	79·65	·04	1·18	16·85	1·32	·96	16·43	·21	5·80	82·81	6·47	4·71
Sugar Beet 'Special Culture'	78·51	·04	1·16	18·08	1·39	·82	16·98	·20	5·39	84·10	6·47	3·84

Since the 'dry matter' of roots may for practical purposes be considered as entirely digestible, the relative feeding value of the different varieties will be in proportion to the percentage of dry matter they contain and the richness of that dry matter in protein. The amount of fat present is so small that it does not call for special consideration. In addition to the usual fodder analysis, a determination of sugar in the juice of the root was made.

Mangels.

The percentages of dry matter in the three varieties examined are :—

	Per cent.
Gate-Post, red	11·14
Giant Yellow Globe	8·19
Golden Fleshed Tankard	10·25

Weight for weight, therefore, the 'Gate-Post' is much the more valuable mangel, containing approximately one-fourth more dry matter than the 'Giant Yellow Globe', which in this respect, it will be remarked, is the poorest of the three varieties examined. The 'Gate-Post' mangel is, further, characterized by a high sugar content, a feature of considerable importance from the feeding standpoint.

The 'Giant Yellow Globe' mangel presents several peculiarities of composition. In the first place, the percentage of dry matter is small, while that of the nitrogenous organic matter is exceptionally large for this class of root. Our experiments go to show that approximately 50 per cent of the nitrogenous matter exists as true protein. The 'Golden Fleshed Tankard' occupies a place very close to that of the Gate-Post.'

Carrots.

The dry matter of the varieties examined may be stated as follows :—

	Per cent.
Improved Short White	8 46
Guerande or Ox-Heart	11·64

From these data we may conclude the last named variety to have the greater feeding value. Not only is it the more valuable from a larger percentage of dry matter, but also from the better quality of that dry matter. This fact is revealed by the data expressing the percentages of sugar in juice, of protein and of fat, all of which are higher in the case of the Ox-Heart carrot.

Turnips.

The three varieties of turnips analysed yielded the following percentages of dry matter :—

	Per cent.
Skirvings	10·35
Champion Purple Top	10·77
Rennie's Prize Purple Top	10·36

Not only from the above data, but also from those of the detailed analysis, it will be observed that such differences in composition as exist are very slight.

Sugar Beets.

In order to learn what improvement in feeding value might result by giving sugar beets that special culture necessary for roots intended for the sugar factory, samples of Vilmorin's Improved, grown respectively under ordinary and special culture at the Experimental Farm, Ottawa, have been analysed. With the exception of, practically, 1 per cent more dry matter in the beets of special culture, the results are exceedingly close. The figures denoting the composition of the water-free substance are for the most of the determinations almost identical. It is, therefore, improbable that there would be any adequate return for the expense involved in giving the beets 'special' culture when they are intended for feeding purposes, and more especially would this be the case if, as is usual, there were a larger yield per acre when grown under ordinary field conditions. The samples analysed contained about 21 per cent of dry matter, three-fourths of which is sugar. Sugar beets are very valuable feed. It is stated, however, that if fed largely, sugar beets cause scouring.

In considering the value of different root crops, not only the composition, but the yield and cost of production per acre should also be taken into account.

COTTON-SEED MEAL.

Numerous inquiries have been received during the past year regarding the composition and use of this concentrated feed stuff, which, as far as many districts are concerned, may be considered as a newly introduced feeding material.

The following determinations have been made on samples recently forwarded for examination:—

	No. 1	No. 2.
Crude protein (albuminoids).....	43·87	43·37
Crude fat or oil.....	11·63	13·11

No. 1 was sent by Mr. F. W. Davidson, Anagance, N.B. No. 2 was received from Mr. G. E. Stopford, Tidnish, N.S., and bore the label of the American Cotton Oil Co., St. Louis, Mo., guaranteeing protein 43·00 per cent, and fat or oil 9·00 per cent. It is believed that No. 1 is from the same source. Both samples are fully equal to the guarantee; indeed, as regards oil, a valuable fodder constituent, they are considerably richer than called for by the vendor's statement.

Information respecting the general use and feeding value of cotton-seed meal is given on page 149 of our report for 1899, where there also will be found a comparative account of the chief concentrated feeds in common use.

BRAN.

Two samples of bran were received from Mr. J. H. Pillar, Russell, Ont., with a request for information as to which of them had the greater feeding value. A partial analysis afforded the subjoined data:

	No. 1.	No. 2.
Moisture.....	11·51	11·31
Protein (albuminoids)....	13·64	13·62
Ash.....	6·32	6·00

No. 1 is to a slight degree the brighter in colour of the two, and contains somewhat fewer buckwheat hulls. However, as far as chemical analysis can determine, these brans are practically identical in feeding value; indeed, the figures would probably not have been closer if both samples had been taken from the same bin. Mr. Pillar writes that these brans were selling in his neighbourhood for $18 and $16 per ton, respectively. The analysis, as we have seen, does not show any such difference in value.

The quality of a bran may be well adjudged from its appearance and freedom from weed seeds and other foreign material.

COCOA-NUT MEAL.

This feeding stuff is the residue after extraction of the oil from the flesh of the cocoa-nut. It is a pleasant-tasted, soft material, of a clean, bright appearance, and is evidently palatable and appetizing.

A sample forwarded by Messrs. Stairs, Sons & Morrow, Halifax, N.S., and imported by A. Cumming & Son, Port of Spain, Trinidad, furnished the following data:—

Analysis of Cocoa-nut Meal.

Moisture	14·65
Fat	5·92
Fibre	11·19
Protein or albuminoids	21·37
Nitrogen-free extract or carbo-hydrates	41·34
Ash	5·53
	100·00

Cocoa-nut meal as a cattle food is practically unknown in Canada, but has earned a good reputation in Europe and certain of the United States (notably in the vicinity of San Francisco), being used more particularly for dairy cows, sheep and swine. The percentage of protein is high, making it a concentrated feed stuff, and it is also rich in fat. These facts, together with the palatableness of the meal, make this food a desirable constituent in the grain ration, provided always that it can be purchased at a reasonable price compared with the various grains and milling products generally used.

CORN MEAL.

In a communication from Mr. A. Broder, M.P., Morrisburg, Ont., who forwarded this sample, the doubt was expressed as to its genuineness. Our analysis, however, makes very clear that it is of excellent quality, and that nothing had been added to it or taken from it.

	Per cent.
Moisture	9·29
Protein	9·69
Fat	4·42
Carbo-hydrates (starch, &c.)	74·33
Fibre	1·01
Ash	1·26
	100·00

Comparing these figures with the published averages of corn meal, a less percentage of moisture is to be noticed in the present sample, which has the effect of increasing the percentage of the other constituents, and thus enhancing its feeding value.

LOW GRADE FLOUR FEED.

This sample was also submitted by Mr. Broder. It had the appearance of a low grade or perhaps slightly damaged flour ; it was quite dark in colour. Under the microscope no trace of other grain than wheat was detected. The data are as follows :—

	Per cent.
Moisture	9·17
Protein	14·85
Fat	3·36
Fibre	·02
Carbo-hydrates (starch, &c.)	71·02
Ash	1·58
	100·00

Such materials can undoubtedly be used to advantage as part of the grain ration, when they can be purchased at a reasonable price. The present sample, it will be noticed, is much richer in protein, though somewhat poorer in fat, than corn meal. The lower grades of flour often contain the germ of the wheat, and for this reason show a higher protein content, making their feeding value greater than that of ordinary flour.

CHICAGO STOCK FEED.

From time to time cattle tonics, condiments and special foods are largely advertised, and their sale pushed by energetic agents. The claims for such are at times preposterous, and their price far in excess of either the cost of their constituents or their worth to the farmer. Such a 'food' condiment was received for analysis in March last from the *Farmer's Advocate,* London, Ont., who in turn received it from a correspondent in Norfolk, Ont. It bore the name of the Chicago Stock Food. It was shown that it had been sold in parts of Ontario at the rate of 30 cents per pound (see *Farmer's Advocate,* March 15, 1900). The request from the *Farmer's Advocate* reads as follows :—

'London, Ont., March 15, 1900.

'Under another cover we mail you a package containing about a pound of the Chicago Stock Food, which is being sold by agents in some parts of the country at exorbitant prices to farmers. One person who was imposed upon wrote us particulars of the matter and sent us a small sample, but not enough for analysis, so we wrote him a second time, and have received what we are now sending you. We should very much like to have a statement from you as to what the food contains, so that its commercial value compared with other foods may be estimated. In the current issue of the *Farmer's Advocate* we have an editorial referring to the matter, and it would certainly emphasize the point and put others on their guard throughout the country if it was shown by your examination that the food is one of about ordinary value.

'(Signed) The William Weld Co., Limited.'

Our analysis of this food or tonic furnished the following data :—

	Per cent.
Moisture	8·38
*Ash	13·26
Protein or albuminoids	15·74
Fat	6·37
Fibre	5·15
Carbo-hydrates	51·10
	100·00

*Containing saline ingredients.

This condiment consists largely of finely ground linseed meal or cake, to which has been added common salt, saltpetre and copperas (sulphate of iron). It has been flavoured by the addition of a small amount of fenugreek.

The prices generally asked for such condition powders are far in excess of their value, whether such materials be considered as medicine or food, or both. The stock feeder or dairyman will find it greatly to his profit to obtain such medicine or treatment as his animals may at any time require rather than to pay exorbitant prices for materials which may or may not benefit his stock, and the nutritive value of which is certainly less than many concentrated feed stuffs on the market.

SUGAR BEETS.

MANITOBA.

In August of the current year we received a communication from the Winnipeg Board of Trade informing us that the Department of Agriculture of Manitoba had undertaken at the board's request a series of experiments in the growth of sugar beets, and asking for an examination of these beets in the farm laboratories. As no analyses had been made by us of sugar beets raised in Manitoba, and as apparently there were no data on record concerning the relative richness of the root as grown in that province, it was decided to undertake the investigation. It was thought desirable at the same time that beets grown on the experimental farms at Brandon, Man., and Indian Head, N.W.T., should be tested, and to this end samples of the six varieties under test at these farms were received, and, together with those forwarded by Mr. Hugh McKellar, Chief Clerk, Department of Agriculture, Winnipeg, Manitoba, submitted to analysis. The particulars of growth of the roots from Winnipeg are furnished by Mr. McKellar in Table I ; their analytical data are given in Table II.

TABLE I—SUGAR BEETS, MANITOBA—1900.

Number.	Name.	Address.	Variety of Beets.	Dates. Sowing.	Dates. Thinning.	Dates. Pulling.	Distance between Rows.	Distance between Plants in row.	—
							inches.	inches.	
1	A. Hutchings	Winnipeg	Klein Wanzleben, Impd.	June 14	July 18	Oct. 16	17	6	Very light sandy soil.
2	A. Hutchings	"	New Danish, Impd	" 14	" 18	" 16	17	6	Near river bank.
3	R. de Vries	Louise Bridge	Impd. Vilmorin	" 14	" 20	" 10	16	6	Heavy black soil on prairie.
4	R. de Vries	"	Klein Wanzleben, Impd.	" 14	" 20	" 10	16	6	
5	Klaas de Vries	"	New Danish, Impd	" 13	" 18	" 10	16	6	Heavy black soil 18 inches deep.
6	Klaas de Vries	"	Klein Wanzleben, Impd.	" 13	" 18	" 10	16	6	Over yellow clay subsoil.
7	Hugh McKay	Fernton	Impd. Vilmorin	" 13	" 25	" 15	16	6	Black soil with a little sand.
8	Hugh McKay	"	Klein Wanzleben, Impd.	" 13	" 25	" 15	16	6	
9	John de Graaf	Louise Bridge	Impd. Vilmorin	" 11	" 19	" 9	16	6	Same soil as 5 & 6.
10	John de Graaf	"	Klein Wanzleben, Impd.	" 11	" 19	" 9	16	6	
11	Jacob de Vries	"	Klein Wanzleben, Impd.	" 12	" 19	" 15	16	6	Same soil as 5 & 6.
12	Jacob de Vries	"	Impd. Vilmorin	" 12	" 19	" 15	16	6	
13	D. de Graaf	"	Impd. Vilmorin	" 28	" 21	" 12	16	6	Stiff heavy black soil.
14	D. de Graaf	"	New Danish, Impd	" 28	" 21	" 12	16	6	
15	W. Herries	"	Impd. Vilmorin	" 12	" 19	" 10	16	6	Same soil as 5 & 6.
16	W. Herries	"	New Danish, Impd	" 12	" 19	" 10	16	6	
17	John P. Haarsma	"	New Danish, Impd	" 14	" 21	" 15	18	6	Black loam with a little sand.
18	John P. Haarsma	"	Klein Wanzleben, Impd.	" 14	" 21	" 15	18	6	Near river bank.

Beets were thinned when plants were from $1\frac{1}{2}$ to 2 inches high and cultivated at that time, then cultivated once during the season. The beets all grew well down in the ground.

TABLE II—ANALYSES OF SUGAR BEETS FROM MANITOBA—1900.

No.	Variety.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root. Lbs.	Oz.
1A	Wanzleben Improved	10·9	15·4	70·7	—	12
1B	" "	11·8	15·6	75·6	—	13
2A	New Danish "	9·9	14·2	69·7	1	3
2B	" "	10·1	14·2	71·1	1	2
3	Vilmorin's "	9·1	13·3	68·4	1	6
4	Wanzleben "	8·9	13·8	64·4	1	5
5	New Danish "	9·7	14·3	67·8	—	12
6	Wanzleben "	11·9	15·8	75·3	—	10
7	Vilmorin's "	10·3	14·9	69·1	1	2
8	Wanzleben "	7·3	10·4	70·1	1	
9	Vilmorin's "	9·2	13·8	66·7	1	
10	Wanzleben "	9·9	14·4	68·7	1	5
11	" "	11·3	15·4	73·3	1	
12	Vilmorin's "	9·9	14·3	69 2	1	3
13	" "	8·4	12·7	66·1	1	7
14	New Danish "	10·5	14·8	70·9	1	4
15	Vilmorin's "	8·7	13·5	64·5	1	
16	New Danish "	9·8	14·1	69·5	—	15
17A	" "	9·5	14·0	67·8	1	
17B	" "	11·1	15·2	73·0	1	7
18A	Wanzleben "	12·5	16·4	76·2	1	1
18B	" "	11·0	15·6	70·5	1	4

The sugar content is not high and the co-efficient of purity is low ; indeed, the results are far from encouraging. It will be remembered, however, that the weather during the early part of the season, both in Manitoba, and the North-west Territories, was extremely dry ; for this reason, the beets failed to get a proper or early start. Mr. McKellar writes : 'So discouraging was the drought that several farmers who got seed did not sow it, while some that sowed it cultivated the plants down, thinking it useless to leave them.' The exceptional dryness of the soil when the seed was sown and the almost entire lack of rain until the latter part of July undoubtedly militated greatly against the normal growth of the roots and the production of sugar. This drought was followed by very heavy rainfalls in August and September—months that should be warm and dry for a high sugar content.

Since in many instances the percentage of sugar is notably increased during the last two or three weeks of the beet's growth—especially if climatic conditions are favourable—duplicate samples from plots Nos. 1, 2, 17 and 18 were taken by Mr. McKellar on November 1—a fortnight after the date of the first collection. These are designated in the table as 1 B, 2 B, 17 B, 18 B, respectively. In three cases out of the four there had been an increase in the saccharine matter, but in all probability this would have been more marked in a normal season ; for the heavy rains, it is reasonable to suppose, had induced vegetative growth rather than the storing up of sugar.

The results obtained on the beets grown at Brandon and Indian Head are given in Table III.

TABLE III—ANALYSES OF SUGAR BEETS FROM MANITOBA AND N. W. T.—1900.

No.	Variety.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root. Lbs.	Oz.	Grown at Experimental Farm.
1	Danish Red Top..... . .	7·4	10·6	69·5		12	Brandon, Manitoba.
2	Wanzleben.....	8·5	12·5	68·1		15	" "
3	Danish Improved	7·2	11·4	63·4		12	" "
4	Red Top Sugar...........	7·8	11·8	65·8		15	" "
5	Vilmorin's Improved.....	9·8	13·2	73·7		11	" "
6	Improved Imperial.	7·4	11·6	63·6		13	" "
1	New Danish Improved....	10·6	14·2	74·6	1	10	Indian Head, N.W.T.
2	Wanzleben................	9·5	13·4	70·9	1	9	" "
3	Danish Improved.........	7·9	11·6	67·6	1	13	" "
4	Red Top Sugar...........	7·7	11·4	67·5	1	15	" "
5	Vilmorin's Improved. ..	11·6	14·8	78·4	1	9	" "
6	Improved Imperial........	6·6	10·8	61·1	2	2	" "

Their treatment at Brandon may be outlined as follows : 'Land in fodder corn in 1899 ; ploughed once and harrowed in spring 1900. Seed sown May 15, roots taken up October 3. Rows 30 inches apart and plants left standing about 9 inches apart in the rows.' Mr. Bedford continues : 'The roots are unusually small, owing to the severe drought of spring and early summer.'

The particulars furnished by Mr. Mackay are : 'Land fallowed 1899, ploughed 5 inches deep and harrowed in spring 1900. Seed sown May 18, roots pulled September 28. Distance between row, 28 inches, distance between root, 7 to 8 inches.'

As regards quality, i.e., sugar content and purity of juice, these beets are no better than those grown at or near Winnipeg. We feel, therefore, obliged to state that the present results have not given any indication of roots sufficiently rich and pure as to be suitable for sugar manufacture.

It is obvious that we are not yet in a position to speak definitely as to the possibility of growing in Manitoba a beet with a high sugar content, owing to the exceptional character of the past season, the fact that all the roots examined did not receive special attention or culture necessary for the best results, and that the samples represent but two localities in the province. Further work another year, when the season is normal, will be necessary to determine that question. It is only right, however, to point out that in many parts of Manitoba the climatic conditions for the purpose of sugar beet growing, which must comprise a sufficient and well distributed rainfall in the early months of growth, a high mean summer temperature and absence of early autumn frost, are not such as to lead us to regard with sanguineness the prospect of obtaining many areas that could furnish an ample supply of rich beets, without which, of course, profitable sugar manufacture would be impossible.

ALBERTA.

At the request of the Department of Agriculture for the North-west Territories, we have examined two samples of sugar beets grown at Magrath and Stirling, Alta., by the Canadian North-west Irrigation Company, of Lethbridge, Alta. Regarding these roots, Mr. C. McGrath, manager of the company, writes : 'The samples forwarded consist of thirteen beets, the four larger ones from Magrath, the others from Stirling —all grown on sod. We were unable to supply either of these settlements with water from our canal system during the past season, owing to the fact that the ditches have only recently been completed. The settlement at Magrath got more rain than Stirling, hence the former place has supplied the larger beets.'

On arrival of the beets at the farm laboratories, it was found that they had dried out considerably, and consequently would show a higher percentage of sugar than present when dug. Of course, it was impossible to ascertain the degree to which concentration of the juice had taken place. Our results are as follows:—

Locality.	Number of roots in Sample.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Coefficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
Magrath	4	15·19	21·02	72·26	1	9
Stirling	9	17·32	22·12	78·3		11

Though undoubtedly the above percentages are exceedingly good, especially when we remember that the roots were grown on sod, I do not think it would be safe to consider them as necessarily indicating that the Lethbridge district would always yield beets with a high sugar content. The fact, already referred to, of the drying out of the beets and the small number examined make it desirable that further data be obtained before final conclusions are drawn.

PRINCE EDWARD ISLAND.

The question of the possibility of growing in Prince Edward Island beets rich enough to make sugar extraction profitable having recently received considerable attention in that province, we have analysed, at the instance of Mr. A. Callaghan, Charlottetown, a number of roots raised there at various points during the past season.

The information furnished respecting them is very meagre and simply states that 'the seed was sown in the middle of June and the crop was harvested November 10. The drills were 18 inches apart, and the beets about 6 inches apart in the drill.' In all, 18 roots were sent. Table IV. sets forth our analytical and other data:

TABLE IV.—Analyses of Sugar Beets from Prince Edward Island, 1900.

Number.	Number of Roots in Sample.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.		Locality.
					Lbs.	Oz.	
1	3	12·0	16·5	72·8	1	13	Port Hill.
2	2	15·5	19·2	80·7	1	7	"
3	4	15·2	18·4	82·4		13	Freeland.
4	3	14·9	18·4	81·1	1	2	Conway.
5	3	12·8	17·1	74·5	1	4	"
6	3	13·1	17·5	74·7	1	9	"

The foregoing results show that these beets are for the most part rich in saccharine matter; indeed, they compare very favourably with those grown for sugar manufacture in Europe and the United States. Judging from the sugar content and degree of purity, I am of the opinion the averages obtained indicate that a beet suitable for profitable sugar extraction can be grown in Prince Edward Island. The amount of work done in this investigation is not sufficient, however, to allow us to speak definitely or decisively as to the success of the industry, if it were established.

The roots in sample 'A' had not been properly earthed, and, as a result, their percentage of sugar was lower than in the other samples. From the appearance of the beets of this sample, about one-third of the root had been developed above ground, a feature which should always be avoided, since it tends to a low sugar content and an excess of certain substances that make difficult the extraction of sugar.

MANITOBA WHEATS.

A COMPARATIVE STUDY OF RED FIFE, PRESTON, STANLEY AND PERCY WHEATS.

As is well known, Red Fife wheat has long been recognized as the standard of excellence for growth in Manitoba and the North-west Territories, yielding a flour rich in gluten and of a high bread-making value. Since, however, this valuable wheat does not always ripen in certain districts before there is danger from frost, Dr. Saunders, Director of the Dominion Experimental Farms, commenced, some years ago, an investigation which had for its object the production of a wheat or wheats of equal value in vigour, productiveness and milling properties with Red Fife, but which would ripen a week to ten days earlier than the latter wheat. The method employed by Dr. Saunders was to cross the Red Fife with earlier ripening varieties (chiefly from Northern Russia), and to grow the cross-breds so obtained, noting their quality, the period required for maturity, &c. Among the wheats so originated are the Preston, Stanley and Percy, the parentage of which is as follows:—

Preston—Ladoga female with Red Fife male.

Stanley—Ladoga female with Red Fife male.

Percy—Ladoga female with White Fife male.

These wheats were originated by Dr. Saunders in 1888, and since that date have been grown in increasing quantities on the experimental farms and elsewhere.

To compare these cross-breds, as regards composition, with Red Fife, analyses have been made from samples of the crop of 1899 grown at the Experimental Farm, Indian Head, N.W.T. The results are tabulated as follows:—

ANALYSES OF WHEATS.

Name.	Locality Grown.	Crop.	Weight per bushel.	Weight of 100 kernels.	Moisture.	Albuminoids.	Fat (ether extract.)	Crude Fibre.	Ash.	Carbohydrates.	Wet Gluten.	Dry Gluten.
			Lbs.	Grams								
Red Fife..	Indian Head, N.W.T	1899	63	3·402	10·68	12·84	2·46	1·85	1·29	70·88	31·39	13·31
Preston..	" "	1899	62¼	3·415	11·56	11·86	2·58	1·93	1·35	70·72	27·83	11·99
Stanley...	" "	1899	63¼	3·4852	11·06	13·16	2·42	2·04	1·41	69·91	33·38	13·47
Percy	" "	1899	63¾	3·6136	10·15	13·67	2·41	2·14	1·66	69·97	34·98	14·72
Average	....		63⅛	3·4789	10·86	12·88	2·47	1·99	1·43	70·37	31·89	13·375

It will not be necessary to discuss in detail the above data, since in previous publications (see especially Bulletin No. 4) we have considered fully the relative values to be assigned to the various constituents when judging of the merits of a wheat. Speaking generally, we may say that the strongest and best wheats, from the baker's standpoint, are those with the highest percentage of gluten (which must be of a firm, elastic quality), and the lowest percentage of moisture.

Judged by accepted chemical standards, all four wheats examined are remarkably good, and compare most favourably with average market samples of the best wheats of the world. This is evidenced by their uniformly excellent percentages of albuminoids and of wet and dry gluten, their low percentage of moisture, and their satisfactory weights per bushel and per 100 kernels.*

A feature particularly worthy of note is the remarkable similarity in composition throughout the series. This shows the close relationship of the wheats. Critically examining the data, it will be seen that of the cross-breds, Preston only falls behind the parent in albuminoids ; both Stanley and Percy show higher percentages in this constituent than Red Fife. The best of the series appears to be the Percy, since it gives slightly higher numbers than any of the others in weight per bushel, weight per 100 grains, and percentages of albuminoids and wet and dry gluten. It also contains the least moisture. As far as could be judged, the quality of the gluten was equally good in all.

Attention may be directed more especially to two estimations throughout the series, and which seem to call for special comment : we refer to the moisture and the fat. The former is much lower than that usually found, even in north-western wheats, and demonstrates the high bread-making value of those varieties ; the latter, an important constituent, is considerably above the average. We are at the moment at a loss to account for this almost abnormal percentage of fat (the usual average being about 1·85 per cent), but consider it from the nutritive point of view as an important and valuable feature.

THE NORMAL PERCENTAGE OF MOISTURE IN WESTERN WHEATS.

From several communications received during the earlier months of the current year, it appeared that considerable apprehension was felt by the millers regarding the moisture content of much of the 1899 wheat crop from parts of Manitoba and the North-west Territories. Thus in a letter under date of February 19, 1900, the Northern Elevator Company, of Winnipeg, write : 'There has been much discussion lately about the percentage of moisture contained in Manitoba wheat of the crop of 1899. It would seem that in the wheat from the western districts there is a greater percentage of moisture than in that grown in the eastern portion of Manitoba. The following is a memorandum showing the percentage on carload recently shipped, and which were tested by the Ogilvie Milling Company :—

	Per cent.		Per cent.
Moosejaw	16·31	Emerson	13·8
Wolseley	15·07	Virden	16·25
Pettapiece	15·62	Virden	13·2
Gretna, Carberry, Winkler, Altona			12·85

'The general supposition is that the normal percentage of moisture in wheat should be 12·5, and the excessive percentage of moisture in wheat in the western portion of the country has given rise to some speculation as to the keeping qualities of such wheat. As we have large quantities in store in country elevators, we are naturally interested in the matter and should feel very much obliged if you will favour us with your opinion.'

Undoubtedly this assertion, if correct, might mean considerable loss, for an excessive moisture-content in the wheat leads to an inferior quality of the flour. On this point Jago, in his work on the 'Chemistry of Wheat, Flour and Bread,' page 236, says :—

'The question of importance is the influence of water on the quality of the grain or flour, and the interpretation to be placed on such results as are here given. As may readily be supposed, a wheat that is grown either in a naturally damp climate, or

* Analytical data of a large number of Canadian and foreign wheats will be found in the Report of the Chemical Division of the Experimental Farms for 1895.

during an unusually wet season, contains more water than one grown under the opposite conditions. Taken into consideration without reference to the other constituents of the grain, a large proportion of water is to be deprecated, for the very simple reason that water is scarcely worth purchasing at the price given for wheat or flour. This however, is not the only objection to the presence of a large percentage of water ; a much more serious objection is based on the fact that such high proportions show that the wheat is unsound, and that in all probability the other constituents will not be of the most promising character. In the first place, damp wheats and flours favour the development of those organisms which produce mustiness or acidity. In the presence of excess of moisture, too, the gluten of flour is rendered soluble in part, and also loses in elasticity. Further, more or less of the starch will be found to have been degraded into dextrin and maltose by diastasis.'

Considering, therefore, that it was desirable in the interests of both farmers and millers to ascertain the correctness or otherwise of this widespread impression regarding the crop of 1899, we requested Mr. David Horn, Chief Grain Inspector of Winnipeg, to make a collection of Manitoba wheats, taking the samples direct from the car, and forwarding them to us for examination. Accordingly, we received in March 9 samples. Mr. Horn writes : 'They are taken from cars passing here (Winnipeg) and sent in self-sealing jars. The wheats have never been brought into the heat. They are ticketed with the name of the station from which the wheats were shipped.'

The wheats on arrival were immediately ground and submitted to careful analysis. The moisture results are given as follows:—

Moisture in Wheats from Manitoba.

Station from which car was shipped.	1899 Crop. Percentage of moisture.
Grenfell	12·44
Broadview	12·63
Wapella	12·14
Glen Ewan	12·57
Hamiota	12·60
Whitewood	12·25
Indian Head	12·29
Winkler	10·25
Alexander	11·55

These percentages are by no means excessive, though slightly higher than those obtained on the Canadian wheats exhibited at the World's Columbian Exposition, Chicago, 1893, which were as follows:—

Average Percentage of Moisture.

Province	Number of Samples.		Percentage of Moisture.
Ontario	26		11·75
Manitoba	9		11·98
North-west Territories	9		11·55
British Columbia	5		11·48
Total	49	Average.	11·69

The difference between these results and those of 1899 crop may be partly due to season, but we think in all probability it is mainly caused by the drying out of the wheats before examination at Chicago; much of the grain exhibited there had been harvested 12 to 14 months when analysed. But be that as it may, we cannot regard the quantity of moisture in the wheat of the 1899 crop as at all excessive or abnormal, nor such as to cause any alarm in respect to the keeping qualities of the wheat or that of the flour produced from them.

CHEMISTRY OF INSECTICIDES AND FUNGICIDES.

WHALE-OIL SOAP.

The efficiency of a wash or spray made from whale oil soap, as a means of destroying many soft-bodied insects, has long been known; during the past few years, however, this insecticide has received special and increasing attention from fruit growers. It is now advocated and largely used for San José scale, Oyster-shell Bark-louse, plant lice, &c., and information regarding the preparation and application of this remedy will be found in the present report of the Entomologist.

The term whale-oil in this connection appears to be synonymous with fish-oil; indeed, according to some authorities, practically all the brands of 'whale-oil' soap upon the market are made from fish oil. The character of the oil used is said to affect the insecticidal power of the soap; and some suppose it is the whale oil that imparts the peculiar virtue to this wash.

It is considered essential for the efficient action of this soap that it should be made with potash and not soda. Potash makes 'soft' soaps, which are viscous or semi-fluid ; soda gives 'hard' and solid soaps. It is probable that potash soaps make the better and more adhesive wash when a hard water has to be used, but whatever may be the cause for the preferment, entomologists are of one mind in considering that potash soaps only should be used.

At the request of the Entomologist (Dr. Fletcher), we have examined several brands, the samples Nos. 1 to 6, inclusive, being received through the kindness of Mr. Geo. E. Fisher, Freeman, Ont. In the following table the percentages of water and potash are given. From these data the comparative value of the soaps may be deducted: those containing the smaller percentage of water and larger percentage of potash obviously being the better:—

ANALYSES OF SOFT SOAPS.

Number.	Marks.	Date Received, 1900.	Water. — Per cent.	Potash. — Per cent.
1	Owens whale-oil soap	May 18th	45·91	5·31
2	Home made soft soap	" 18th	66·48	6·17
3	Toronto Peerless soft oil soap	" 18th	41·51	8·78
4	Toronto whale-oil soap	" 18th	48·94	6·65
5	Hamilton vegetable oil soap	" 18th	73·82	1·47
6	London soap	" 18th	56·49	5·62
7	J. J. Ward, Consecon	April 17th	21·04	·054

In speaking of the composition of soft soaps, Allen, in his 'Commercial Organic Analysis,' Vol. II., Pt. I., p. 300, says: 'But few complete analyses of soft soaps have been published, but the proportion of water in samples of good quality is usually between 35 and 45 per cent, whilst the anhydrous oxide (potash) varies from 8·8 to 11·2 per cent.' Leaving out of consideration No. 7, which is a soda soap, it will be seen that the majority of the samples examined are below the standard here given.

'Can the whale-oil soap used in spraying for San José scale benefit the tree in any way other than as an insecticide?' This is a question frequently asked of us. Many orchardists affirm that there is a marked effect upon the vigour of the tree, as shown by the colour of the foliage and the improved appearance of the fruit, that can scarcely be attributed to the insecticidal properties of the soap. We offer the following as an answer to the foregoing question and as a probable explanation of the statement just cited:—

Whale-oil soap of good quality will contain from 9 to 12 per cent of potash. This element, as is well known, is an important and valuable constituent of plant food, and especially so for fruit trees. It invigorates their growth and tends to the production of fruit with high flavour and good appearance.

It is not at all probable that there is any absorption of the potash from the soap spray through the bark or leaves, as many suppose ; the potash, in common with other mineral foods, must be absorbed from the soil through the roots. If the potash in the soap is to act as a food for the tree, it must follow the same course. It is not difficult to understand how this may readily take place, for sooner or later—probably within two or three weeks of spraying—the rains have washed off the soap, and it has been received and absorbed by the soil in the immediate neighbourhood of the roots. There it is gradually converted into assimilable compounds which can feed the tree.

We may now ask if there is sufficient potash in the amount of soap solution sprayed on the tree to make its value as a fertilizer worth considering. In making the solution for the San José scale, 2 pounds of soap are used per gallon, and probably 2 gallons will be required for a well-grown, mature tree. A simple calculation, on the basis of 10 per cent of potash in the soap and 35 trees to the acre, will show that the soil of each acre of orchard so sprayed receives 14 pounds of actual potash, that may subsequently be set free as plant food. This, though not a heavy application, would, in my opinion, be quite sufficient on many soils to produce a marked improvement. The usual dressing of the fertilizer muriate of potash is 100 pounds per acre, equivalent to an application of 50 pounds of actual potash. Each spraying with whale-oil soap, therefore, it is seen, furnishes an amount of potash somewhat greater than one-fourth of that supplied when using the above-named fertilizer in ordinary dressings.

ARBORINE.

Glen's Arborine is the name given to a much-advertised material for which is claimed very remarkable qualities as an insecticide, as well as the power of protection of fruit trees against mice and other vermin. During the past season numerous requests have been received for information regarding its nature and composition. Thus, in August last the editor of the *Canadian Horticulturist* writes: 'Members of the Ontario Fruit-growers' Association are continually making inquiries as to the nature of Arborine. If you could examine this insecticide, the information would prove of interest to many orchardists.' We, accordingly, procured an unopened 1-pound canister, which bears the following statement :—'A guaranteed protection to fruit and ornamental trees from rabbits, sheep, mice, borers, San José scale and insects. *Directions:* Mix the contents of this can in 1 quart of sweet milk, stir until all is dissolved. Apply with a clean paint brush immediately after mixing, or before milk sours. Price, $2.'

Arborine is a fine powder having the appearance of a yellowish ochre, possessing a peculiar odour not unlike onions, and which, on identification, proved to be that of asafœtida. Under the microscope, many small yellow particles were observed, which, on testing, gave all the reactions for sulphur. A qualitative analysis showed it to consist essentially of ochre, sulphur and asafœtida. The results of a quantitative examination afforded the following data :—

	Per cent.
Moisture	·86
Sulphur	38·73
Oxide of iron and alumina	23·87
Mineral matter, insoluble in acid	22·44
Sulphate of lime	·88

The sum total of these percentages, taken from 100, leaves in the neighbourhood of 13 per cent to be accounted for. This we believe to be chiefly asafœtida, for extraction of the Arborine with carbon bisulphide not only takes out the sulphur above recorded, but also about 6 per cent of a resinous substance having all the characteristics of asafœtida. Experiments show that from 10 to 25 per cent of asafœtida, according to the quality of the substance, is soluble in carbon bisulphide. I think we are, therefore, justified in supposing that the difference already referred to is largely due to the presence of this gum-resin, and that Arborine is essentially a mixture of ochre, sulphur and asafœtida.

Regarding its efficiency, we have no data to bring forward. Most probably, it acts as an excellent deterrent against the attacks of certain forms of life, protecting the tree by virtue of its sulphur, and possibly to a still greater extent by reason of the peculiarly unpleasant and penetrating odour that it emanates, due to its asafœtida. We can only remark that the price asked for this material seems to be greatly in advance of the cost of its components.

WEED KILLING COMPOUNDS.

HARVESTA CHEMICAL COMPOUND—A WEED DESTROYER.

This is a brownish coloured fluid, made in New Orleans, La., and sold for the purpose of destroying weeds in gravel paths. It was analysed at Dr. Fletcher's request.

The mixture was neither caustic nor alkaline, and on analysis was found to contain arsenite of soda and common salt. These together amounted to 4·0 per cent, or 6·4 ounces per gallon ; the common salt being 1·69 per cent, or 2·7 ounces per gallon.

No doubt this is an effective weed exterminator, since both its constituents have long been known and used for this purpose. It is, perhaps, scarcely necessary to point out that such preparations should only be used on paths or where it is desired to kill all vegetation.

WEED KILLING COMPOUNDS.

For those who desire to prepare for themselves a weed-killing fluid we furnish the following recipes. The fluids are cheap and easily prepared, and have been used with good effect :—

1.—To boiling water add common salt at the rate of one pound to one gallon. As soon as the salt is dissolved, and the liquid is still hot, apply it by means of a watering can.

2.—White arsenic	pounds	1
Washing soda	"	2
Water	gallons	3

Boil and dilute with from two to three times its volume of water. Apply while still warm in fine weather. This solution is highly poisonous.

3.—Blue vitriol (bluestone)	pounds	2
Water (hot)	gallons	6

Put the bluestone in a crock or wooden tub and pour on the water. Use while still hot.

4.—Sulphuric acid in the proportion of one part of acid to 1,000 of water has also been effectively used where the soil does not contain any appreciable amount of carbonate of lime. If there is effervescence when the acid solution is sprinkled on the path (showing the presence of carbonate) this preparation will be of no value.

5.—Salt cake, or acid sulphate of soda, a by-product in the manufacture of muriatic acid, applied in solution (one pound to one gallon) is very effective.

With respect to the use of any of the foregoing, it may be pointed out that thorough applications, especially at the beginning of the season, are to be advised, rather than lighter and more frequent doses. All these chemicals will do serious injury to soils intended for cultivation.

THE COLE BUTTER-MAKING PROCESS.

This method or process consists simply of blowing air (previously warmed by water to a temperature between 70° F. and 80° F.) through the well-ripened cream, contained in a cylindrical glass vessel, 21 inches high and 13 inches in diameter.

The apparatus consisted of a double-acting air pump (worked by a belt from the shafting) which forced air to the bottom of a copper vessel, 13 inches in diameter and 16 inches high, containing water at a temperature of 85° F. to 90° F. After passing through the water, the air was conducted from the copper vessel by a piece of block-tin tubing terminating in a coil resting on the bottom of the churn. The air escaped from the open end of the coil, as well as from small holes pierced therein.

The agitation or churning is accomplished simply by the air bubbling through the cream.

To ascertain what foundation there might be for the claim of the inventor or promoter that 20 to 30 per cent more butter could be obtained by this method than by any other, and to learn what merits, if any, this process might possess over that ordinarily in use, two series of experiments were made last November. The first had for its object more especially the tracing of the butter-fat from the beginning to the finish of the process. The plan adopted and the analytical methods used were such as to yield data of an exact character, and consequently would show any loss or gain in butter-fat during the ripening of the cream in the period previous to churning or during that operation. The second investigation was undertaken with a view of obtaining data regarding the economy of this process as compared with that in general use. All the work was most carefully done, and, as already stated, only the most accurate and approved chemical methods were employed for the analysis of the cream, buttermilk and butter. Final results only will be here recorded, in order that this report may be presented in as concise a form as possible.

Experiment 'A.'—On November 22, 1899, a quantity of cream was set aside in the usual shot-gun can to ripen in the dairy, the temperature throughout the ripening period being maintained at about 70° F. As directed by Mr. Cole, the cream was stirred at intervals until the 27th, when the churning was made. The data respecting the weight and composition of the cream, and the total amount of fat present on November 22, are as follows :—

Weight of cream	pounds	13·9
Fat in cream	percentage	28·54
Fat in cream	pounds	3·96

On November 27, immediately before churning, the cream was again weighed and analysed, and afforded the following data :—

Weight of cream	pounds	13·81
Fat in cream	percentage	28·33
Fat in cream	pounds	3·91

Comparing these with the foregoing figures, it will be seen that there was no increase in the amount of butter-fat during the ripening of the cream.

The churning (November 27) was made in twenty minutes, the directions furnished by the promoter being followed as closely as possible. After the butter had been carefully collected, the buttermilk and subsequent wash-waters were mixed, weighed and analysed :—

Weight of buttermilk	pounds	160
Fat in buttermilk	percentage	0·124
Fat in buttermilk	pounds	0·198

From the above figures and those preceding, it can be shown by calculation that 5·07 per cent of the total fat supplied in the cream appeared in the buttermilk.

The data respecting the butter obtained may now be cited :—

Weight of butter	pounds	4·5
Fat in butter	percentage	82·15
Fat in butter	pounds	3·696

The following statement summarizes the results : —

Fat in cream as churned	pounds		3·91
" buttermilk	pounds	0·198	
" butter	"	3·696	
	pounds	3·894	

It is thus seen that practically all the fat present in the cream immediately prior to churning was accounted for, and, further, that there was no increase in its amount —due either to fatty degeneration of the albuminoids or absorption of atmospheric oxygen, as claimed by Mr. Cole—either prior to churning or during the churning process.

Experiment 'B.'—November 28, 1899 : A quantity of cream having been ripened in accordance with the afore-mentioned directions, was thoroughly mixed (so as to be uniform in quality throughout), and divided ; half was churned by the Cole process, and half was churned by the farm dairyman in the churn ordinarily used in our dairy. The data are tabulated as follows :—

By Cole Process—

Weight of cream	pounds	27	
" butter obtained	pounds	8·125	
Fat in butter	percentage	83·48	
Fat in butter	pounds		6·912
Buttermilk and washings	pounds	130	
Fat in buttermilk	percentage	0·26	
Fat in buttermilk	pounds		0·338
Total weight of fat	pounds		7·25

By Ordinary Method—

Weight of cream	pounds	27	
" butter obtained	"	8·656	
Fat in butter	percentage	84·25	
Fat in butter	pounds		7·29
Buttermilk and washings	pounds	20	
Fat in buttermilk	percentage	0·2	
Fat in buttermilk	pounds		0·04
Total weight of fat	pounds		7·33

Percentage of the total fat supplied in cream, as found in the buttermilk by Cole process	4·61
Percentage of the total fat supplied in cream, as found in the buttermilk by ordinary method	0·54

It is thus evident that we were unable to obtain as much butter by the Cole as by the ordinary method, and, that there is a much greater loss of fat in the buttermilk by the former than by the latter process.

The whole process, from first to last, was carefully watched by Mr. Grisdale, the Agriculturist, who begs to submit the following statement respecting the method and the quality of the butter produced :—

'A number of carefully carried out trials of the Cole butter-making process have been made in the dairy of the Experimental Farm under my direct supervision, and as a result I have no hesitation in saying that in point of efficiency or economy this newly introduced method has nothing to recommend it. It is quite apparent that there is a very much larger loss of butter-fat in the buttermilk than by the ordinary methods.

'Regarding the quality of the butter, we have to state that while it was not unpleasant to taste when first churned, it soon developed a strong flavour, which became more and more marked until at the end of two weeks it was quite unpalatable, though it could not be classed as rancid.

'In texture, it is very fine-grained with a slight greasiness apparent, which would detract much from its commercial value. The claim advanced by Mr. Cole, that a uniform and constant flavour would be ensured by his process, is not sustained; butters made at short intervals—say, of a few days or a week—differed very much in flavour from one another, and we are of the opinion that the ripeness of the cream influences the flavour as much when churned by this method as when handled in the regular way.'

Being desirous of furnishing our readers and correspondents with the opinions of those who were competent to speak in the matter of the reputed increases of fat during the ripening or churning of cream—opinions which we felt sure would support the position we had taken, that there was no appreciable increase—we sent the following letter to Dr. S. M. Babcock, Chemist, Experiment Station, Madison, Wis., and to Dr. L. L. VanSlyke, Chemist, Experiment Station, Geneva, N.Y., both dairy chemists of wide repute :—

'Have you in the course of your work ever made any investigation regarding the reputed formation of butter-fat from albuminoids during the ripening of cream or cheese? If you can furnish me with any data, or refer me to any recent work on this point, I shall feel greatly obliged, as we have at present under examination a butter-making process, the inventor of which claims an increase in the amount of fat from this cause.'

Their replies are as follows :—

'Yours of November 23 in relation to the formation of fat from albuminoids in the ripening of cream or cheese, is duly received.

'I know of no recent investigation on this point, but am certain that the general opinion among investigators is that there is practically no change of fat through the fatty degeneration of albuminoids in either cream or cheese.

'(Sgnd.) S. M. BABCOCK.'

'In reply to your inquiry of recent date, I would say that we have paid special attention to the possible formation of fat from albuminoids during the ripening of cheese and we have never found any evidence whatever that such change takes place.

'(Sgnd.) L. L. VANSLYKE.'

From time to time farmers and dairymen have brought before them by interested, if not dishonest, persons, methods, recipes, or materials the employment of which it is claimed will effect a larger yield of butter from a given weight of cream than can be obtained by the ordinary process. Several of these methods have been examined in the laboratories of the Experimental Farms, with the result, as might be expected, of proving them worthless and fraudulent. In most instances there is a direct failure to obtain a larger yield of butter—and in those in which a somewhat greater weight of product results, the increase has been shown to be due to the presence of excess of water or curd, or both, rendering the article one which the law considers adulterated. Further, such so-called butter, even when freshly made, is far inferior to ordinary good butter, and having exceedingly poor keeping qualities, soon becomes altogether unmarketable.

We know as a scientific fact that the ordinary methods in use in our dairies and creameries, if rightly conducted, practically abstract all the butter-fat, and we also know that there are no means for increasing the butter-fat in cream by the addition of foreign materials, by absorption of oxygen, or by conversion of the albuminoids, as claimed by many of those having methods for sale. Any addition to the weight of butter by artificial means must come from the admixture of curd or water, or both—and such, as we have already stated, do not yield either a legal or marketable butter, but a product which will bring trouble and loss to the maker.

It is all important to the dairying interests of the Dominion, more especially as we are now building up a large and valuable export trade in butter with Great Britain, that we should have nothing to do with any of the methods here alluded to.

WATER FROM FARM HOMESTEADS.

Of the 75 samples of water received during the past year, 41 have been submitted to complete analysis ; their data are recorded in the subjoined table. The remaining samples were not examined either owing to the quantity of water being inadequate, dirty bottles, or old and used corks having been employed. In order to avoid disappointment and unnecessary expense, farmers and dairymen wishing to avail themselves of the privilege extended in this matter, should first write for instructions on the collection and shipment of samples, furnished on application, so that the water when received will be in such a condition that a reliable analysis may be made.

The analysis of mineral waters and examination of waters for medicinal purposes is not undertaken ; it is only samples from farmers' wells and dairies that can be received, and these must be taken in accordance with the directions already referred to, and the express charges prepaid.

The waters comprise 21 samples from Ontario (of which 10 were reported polluted, 5 suspicious and probably dangerous, and 6 as free from contamination) ; 5 from Manitoba ; 4 from the North-west Territories ; 3 from British Columbia ; 3 from Quebec ; 3 from New Brunswick ; 1 from Nova Scotia.

Much has been said in past reports of this Division on the danger to the health of the farmer and his family in using water contaminated by organic filth, and also as to the effect of such water upon the thriftiness and health of his live stock. We have also pointed out how essential pure water is for creameries and cheese factories, for without it first-class products cannot be obtained. The following paragraphs, taken from a former report of this Division, however, may be worthy of repetition, as showing how well water may become contaminated:—

'The most common cause of well pollution has been the sinking of the well in the barn-yard or under one of the farm buildings. We object to this practice on principle and hold that only under the most exceptional circumstances can it be followed with impunity. From our experience, it would appear that in the majority of instances it is only a matter of time before such wells act as cess pits. Unless most careful provision is made to prevent the liquid manure from soaking into the ground, it sooner or later, according to the nature of the soil, finds its way into the well. If this be so, it behooves all farmers and dairymen to locate their well at a safe distance from such infecting sources.

ANALYSIS OF

RESULTS STATED IN

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.
			1899.				
1	St. Marys, Ont	J. S	Dec. 7	None.	·12	·033	2·2
2	Urquhart, Alta	H. R. F	" 14	·024	·063	·013	18·2
3	Hanover, Ont	J. J. W., No. 1	" 14	·138	·09	2·620	6·4
4	"	J. J. W., No. 2	" 14	·175	·105	3·639	10·2
5	Wheatland, Man	J. A. N	" 26	·10	·31	1·087	178·0
			1900.				
6	McKenzie, Man	W. W	Jan. 4	None.	·69	·115	58·0
7	Sonya, Ont	J. W	" 11	Traces.	·20	2·784	78·0
8	Granby, Que.	W. K. per Dr. M. C. B.	Feb. 6	·195	·065	·827	1·30
9	Chilliwack, B.C	A. E. W	Mar. 7	None.	·160	Traces.	·60
10	Fulton, Ont	T. T., No. 1	" 15	·137	·387	·630	·90
11	"	T. T., No. 2	" 15	·012	·287	936	3·50
12	Barrie, Ont	F. McT.	" 24	·045	·160	2·994	7·50
13	Melita, Man	J. W	" 29	·512	·31	·336	15·0
14	Auburn, Ont.	W. D	April 19	·025	·12	2·928	6·2
15	Grenfell, N.W.T.	F. E. D	May 2	·070	·29	2·758	33·5
16	Morris, Man	J. T. B.	" 19	3·33	·23	None.	4000·0
17	Calgary, N.W.T	P. T. B.	" 23	1·11	·08	None.	6·8
18	Chatham, N.B	D. P. Co., No. 1	" 23	None.	·102	·1317	·6
19	"	D. P. Co., No. 2	" 23	None.	·155	·0263	·4
20	Billing's Bridge, Ont	N. G.	July 7	·23	·29	None.	14·0
21	Calgary, N.W.T	T. S. C. L. Well	" 30	None.	·095	2·142	3·5
22	Tecumseh, Ont.	Wm. McG	Aug. 1	17·85	·05	1·174	11108·3
23	Rifle Range, Ottawa, Ont	Lt. C. T., No. 1	" 13	·029	·242	·668	4·0
24	" "	" No. 2	" 13	·016	·165	4·623	10·4
25	" "	" No. 3	" 13	·016	·135	2·935	16·3
26	Pickering, Ont.	G. P.	" 20	·08	2·61	8·699	45·6
27	North Salt Spring, B.C	F. L.	Sept. 15	69	·265	·1317	12 0
28	Westport, N.S	E. C. B	Oct. 1	·017	·300	·0173	48·0
29	Shellmouth, Man	W. L. W.	" 11	·156	·218	13·943	21·5
30	Sussex, N.B.	W. W. H.	" 19	·26	1·466	·0724	8·6
31	Miller's Corner, Ont	H. W. G.	Nov. 8	3·85	·33	1·30	90·0
32	Buena Vista, Rockliffe	E. H. M	" 9	1·51	·647	·381	5·6
33	St. Catherines, Ont	F. B.	" 12	·124	·196	1 230	291·0
34	Lytton, B.C.	A. L.	" 12	·01	·04	·019	Sl. trace
35	Anticosti Island, Que	Dr. D. J. S	" 12	·042	·12	1·356	23·0
36	" "	"	" 12	1·05	·104	·317	113·0
37	Deer Park, Ont	E. Q.	" 16	·035	·158	5·368	10·8
38	Tilsonburg, Ont	E. D. T., No. 1.	" 16	·014	·086	6·987	4·8
39	"	" No. 2	" 16	·016	·120	8·703	8·0
40	"	" No. 3.	" 16	·08	·277	20·282	38·0
41	"	" No. 4	" 16	·008	·117	17·082	18 0

WELL WATERS, 1900.

PARTS PER MILLION.

Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
260·0	230·0	30·0	Slight traces........	Free from pollution, a wholesome water.
342·0	282·0	60·0	None...............	Free from all drainage matter of a pernicious character.
298·0	224·0	74·0	Heavy traces.......	Polluted, an unsafe water.
392·0	282·0	110·0	Traces..............	" a decidedly dangerous water.
2458·4	1748·8	709·6	....	Highly charged with saline matter.
7978·0	6228·0	1750·0	Traces......	Highly charged with saline matter.
660·0	545·0	115·0	....	Contaminated; use attended with danger.
25·2	14·0	11·2	Traces....	Water contains drainage matter.
117·6	100·0	17·6	"	A first class water; free from all pollution.
43·0	17·0	26·0	Traces..	A doubtful water.
158·5	104·5	54·0	"	Not first class, possibly polluted.
264·0	192·0	72·0	Heavy traces.....	Indication of pollution; very doubtful purity.
1879·6	1327·2	552·4	Traces.	Highly saline and unpalatable.
330·0	220·0	110·0	None........	Somewhat suspicious, indication of previous contamination.
3501·0	3041·0	460·0	....	Strongly saline and probably purgative.
8256·0	6394·0	1862·0	Traces......	Very strongly saline, unfit for use unless distilled.
1201·6	1052·8	148·8	None...............	Probably free from organic pollution, but very saline.
40·0	22·4	11·6	"	Free from pollution and wholesome.
40·0	28·0	12·0	Very slight traces...	" "
608·0	428·0	180·0	Heavy traces........	Highly suspicious; of very doubtful purity.
374·0	226·0	148·0	"	" " "
22751·2	....	....	....	Saline water.
64·0	32·0	32·0	Traces.......	Unpolluted and wholesome.
126·4	64·4	62·0	Slight traces........	Good drinking water, free from contamination.
190·0	120·0	70·0	Traces.....	Free from pollution.
608·0	342·8	265·2	Heavy traces . ..	Seriously contaminated.
271·2	189·6	81·6	"	Very suspicious, drainage matter indicated.
278·4	205·6	72·8	Traces.......	Indication of pollution, somewhat suspicious.
484·4	318·8	165·6	Very heavy traces...	Very seriously polluted with drainage matter.
104·0	51·2	51·8	" " ...	Dangerously contaminated.
564·8	347·2	217·6	Heavy traces . ..	Most seriously polluted.
368·0	251·0	97·0	Traces..............	Dangerously polluted.
2527·6	2240·4	287·2	None........	Probably containing drainage matter, dangerous water.
185·2	126·8	58·4	"	Excellent water, free from injurious matter.
257·6	138·8	118·8	Traces...............	A water of suspicious quality.
487·2	413·2	74·0	Slight traces.........	Water of doubtful purity.
388·0	265·6	122·4	"	Dangerously contaminated with organic matter.
278·4	164·0	114·4	Very slight traces...	Probably a wholesome water.
418·4	221·2	197·2	Heavy traces	Very seriously polluted.
576·0	363·2	212·8	Very heavy traces...	Dangerously contaminated.
451·2	274·4	176·8	Slight traces.........	Bad water, containing a considerable amount of drainage matter.

'The greatest care should be taken at cheese factories and creameries that the waste water does not find its way into the water supply, and to insure this thorough and efficient drainage is necessary.

'Further, there is much room for improvement in keeping the buildings and barn-yards clean. If greater care had been exercised in this matter, many wells which are reeking with filth would to-day be free from impurity. Apart from the question that a dirty barn-yard means a loss of valuable plant food—a question well worthy of closer consideration—there remains the equally important fact that such is usually a menace to health through contamination of the well water.'

We are pleased to note that driven and bored wells, supplied with windmill power, are becoming more and more common. Such wells may be situated at a considerable distance from the farm buildings, and thus obtain their water from a source about which there can be no reasonable doubt as to purity.

Several of the samples received from the North-west Territories and Manitoba were found to be strongly saline, and for this reason non-potable. The chief constituents of this soluble mineral matter are common salt (sodium chloride), Glauber's salt (sodium sulphate), and Epsom salts (magnesium sulphate). A part of the latter might be precipitated by the judicious addition of lime water, but such a plan of purification is only effective when other salts—sulphate and chloride of sodium are absent. In the majority of instances, distillation must be resorted to if a wholesome, potable water is to be obtained. Small household stills, cheap and easy of management, and which can be used on the kitchen stove, are now procurable, and are to be strongly recommended to farmers in alkali districts for furnishing a supply of good drinking water, free from saline matter.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1900.

OTTAWA, December 29, 1900.

DR. WM. SAUNDERS,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially before the Division of Entomology and Botany during the past season. Owing to the large increase in correspondence and the numerous species of insects and plants inquired about, it has been somewhat difficult to decide what subjects could be most usefully treated of in the present report. I have prepared articles upon those subjects concerning which I thought information would be of most service to the farmers, fruit-growers and gardeners of Canada.

Since the fitting up of a new room for the exhibition of specimens, many visitors to the Central Experimental Farm have availed themselves of the opportunity of consulting the collections which are now being gradually arranged and put into shape for reference. Many valuable additions have been made during the year to both the entomological and botanical collections.

Considerable progress has been made in the studies of the life-histories of our native insects, both noxious and beneficial, and a fine collection illustrating all stages of their development is being gradually accumulated. During the past year many specimens of inflated caterpillars have been prepared by Mr. Arthur Gibson, assistant in the Division, and are much admired by visitors.

The experiments in growing grasses and other fodder plants have been continued and are of great interest.

The Apiary, as heretofore, has been looked after by Mr. John Fixter, the farm foreman, and his report on that branch of the division work is printed at page 243.

Correspondence.—From November 30, 1899, to November 30, 1900, the number of letters, exclusive of circulars, received by the Division, was 3,017, and the number of letters despatched was 2,847.

Meetings Attended.—Meetings of farmers, dairymen, fruit-growers, &c., have been attended whenever official duties would allow of my absence from Ottawa. Addresses were delivered at the following places : Granby, Que., February 20 and 21 ; Cowansville, Que., March 14 and 15 ; St. Catharines, Ont., March 20 ; Danville, Que., September 5 ; Niagara Falls, Ont., December 5 and 7 ; London, Ont., November 13, 14 and 15, attending the annual meeting of the Entomological Society of Ontario. Meetings have also been attended and addresses delivered before the Toronto and Montreal branches of the Entomological Society, and also before the Toronto and Ottawa Normal School students on nature study. In June last on account of reports received from Manitoba of serious depredations on crops by locusts, and at the request of the Provincial Minister of Agriculture, I was instructed by the Honourable the Minister of Agriculture to proceed to Manitoba and investigate the matter. Accordingly, on June 21 I left Ottawa, and, having joined the Chief Clerk of the provincial department at Winnipeg, visited some of the worst affected districts. This matter is reported upon later on.

In response to a request to the Minister from the government of the North-west Territories, I then went on to Regina and joined the Hon. G. H. V. Bulyea and, in company with him and Mr. Angus Mackay, the Superintendent of the Experimental Farm for the North-west Territories, went to the Prince Albert district and held a series of farmers' meetings. Addresses were delivered upon agricultural subjects with special reference to the control and eradication of noxious weeds. These meetings were very successful, and the country traversed—a circuit of about 200 miles through a country of great fertility—was of extreme interest. Leaving Prince Albert on July 7, where the first meeting was held the previous day, we drove east and south and held meetings at Colleston, July 7, Melfort, July 9, Kinistino and Harperview, July 10, St. Louis, July 11, Lindsay and Willoughby, July 12, Rosthern, July 13, and back to Duck Lake on the railway on July 13. A supplementary and very largely attended meeting was held at the request of Mr. Wm. Trant, at Lumsden, twenty miles from Regina. Several excellent farms were examined en route and much valuable information as to the nature of the country and its suitability for various crops was acquired, which will be of much use to me in the future.

Acknowledgments.—My special thanks are gratefully tendered to the following for frequent and valuable assistance : to Prof. John Macoun, of Ottawa ; Prof. J. B. Smith, of New Brunswick, New Jersey ; Dr. L. O. Howard and Messrs. B. T. Galloway and A. F. Woods, of Washington ; Prof. F. M. Webster, of Ohio, and Mr. G. B. King, of Lawrence, Mass., for identification of specimens, and also to Prof. C. C. James, Deputy Minister of Agriculture for Ontario ; Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia, and Mr. Hugh McKellar, Chief Clerk of the Department of Agriculture for Manitoba, for prompt notification of outbreaks of injurious insects. To Mr. R. M. Palmer, Inspector of Fruit Pests for British Columbia, and the Rev. Father Burke, of Alberton, P.E.I., I am indebted for reliable reports on insect injuries and the condition of the crops in their respective provinces, all of which have been of great service to me in making the work of the division under my charge useful to the farmers of Canada.

In conclusion I have much pleasure in testifying to the assiduity and excellence of the work performed by my assistants, Mr. J. A. Guignard, B.A., and Mr. Arthur Gibson, in office hours or afterwards whenever required.

I have the honour to be, sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

INSECT PESTS.

THE HESSIAN FLY
(Cecidomyia destructor, Say).

A serious outbreak of the Hessian Fly in the fall wheat fields of western Ontario during the past season has to be recorded. There was some appearance of the summer brood in the same districts, but only a few references were made to the insect, until it was found that the new crop of fall wheat was infested to a degree which has seldom been seen in Canada for many years. The district where the greatest harm was done, was in the area lying to the west of Lake Ontario, and north of Lake Erie.


Fig. 1.—The Hessian Fly—enlarged and natural size.

Prof. Lochhead, of the Guelph, Ontario, Agricultural College, writes as follows :—

'Guelph, December 22.—The Hessian Fly is very general in Essex, Kent, Elgin, Norfolk, Haldimand, Lincoln and Middlesex ; it is reported from various parts of Welland, Lambton, Huron, Oxford and Brant. Occasional mention is made of it in Perth and Simcoe. Practically none is reported from Bruce, Grey, Wellington, Waterloo and Dufferin. The eastern half of the province is practically free from the Hessian Fly. (The above information was obtained chiefly through the reports of the Bureau of Industries.) Professor Pettit, of the Michigan Agricultural College, writes me, December 1, that this year all early sown wheat, and, in fact, all wheat sown before October 1, is infested, some of it badly. This is the case over a great part of the state. In ordinary years the third week in September is late enough to sow wheat to escape the fly, and we should not, I think, make our deductions from two such unusual years as the last were.'

'Brantford (Brant Co.), Ont., August 3.—The Hessian Fly has been bad in this neighbourhood this season. How late should I sow my wheat in order to escape the fly altogether ? Would there be any use in sowing as small a plot as half an acre on a fifty-acre farm, to act as a trap, if no neighbour sowed any wheat extra early ? What would be the best date to sow ?'—T. F. Howell.

'Waterford (Norfolk Co.), Ont., Nov. 7.—The Hessian Fly seemed to injure the sample of wheat this year by preventing some of the grain from maturing. Late sown fall wheat seems rather free this autumn, but that sown early seems to be in some cases so badly infested that farmers are talking of ploughing it under.'

'Waterford (Norfolk Co.), Ont., November 29.—I have found two fields quite close together which are affected by the Hessian Fly. The grower, Mr. James Clark, states that both fields were sown from 15th to 23rd September. In one, a field of Clawson wheat, I believe that 80 per cent of the plants contain Hessian Fly puparia, and in the other field, of Democrat wheat, about 30 per cent. You will notice from the specimens sent that the Clawson plants affected show the upper and earlier sprout generally killed, but there is an uninjured sprout growing up from the original seed. The Democrat variety, on the other hand, shows that the insect has not injured the original sprout to so great an extent, and, consequently, this second sprout from the seed has not made its appearance in so many cases as in the Clawson. With respect to the appearance of the two fields, the Democrat looks quite green, healthy, and apparently uninjured, but the Clawson appears wilted and not nearly so green. The difference in favour of the less injured field was very noticeable. About November 8, I found no larvæ in the fields; all had changed to flax-seeds. This fall has been very remarkably free from early frost.'—N. H. Cowdry.

'Belmont (Middlesex Co.), Ont., December 4.—Fall wheat has been considerably injured in this section by Hessian Fly. Feeble wheat on poorly-prepared ground is very badly injured, portions of it being entirely killed out. Most of the wheat turned yellow, more or less, during October, owing, I think, partly to the unseasonably warm weather, causing rust to develope. Since receiving your letter, I have carefully examined many fields of wheat, and am convinced that all the damage was not done by Hessian Fly. Wheat that has a bulky vigorous growth promises to give a fair crop next year, as the stools have many comparatively sound and healthy shoots left ; after feeding the fly, they had a lot of vitality and substance remaining, but badly nourished wheat had little or nothing left after the flies had fed on them, and they are now dead, or nearly so. The summer brood did considerable damage here, both to wheat and barley. I am satisfied that the fly cut me short 100 bushels on 27 acres. Heavy crops of wheat were hardly touched by the fly ; but, where the wheat was winter-killed, or otherwise weakened and thin, it did a lot of damage Many farmers held off their sowing this year to escape the fly, but this, I think, is a mistake. Late wheat will be weak and more liable to winter-kill, and for this reason will fall a more easy prey to the summer brood next year. I believe that if wheat is sown at the right time on rich and well-prepared land, it will get a vigorous, bulky growth in the fall, and will thus be able to withstand the attacks of both broods of the fly.'—H. Pettit.

'Ferguson (Middlesex Co.), Ont., October 30.—Since reading Dr. Saunders's article in the Entomological Society of Ontario report for 1882, I have found that the suggestions there made concerning treatment for the Hessian Fly work very well. However, I have followed them again to the letter this year, working the land with the twin plough immediately after the crop was taken off, then ploughing after, and sowing from 17th to 24th September, and have now under wheat, ground that was previously sown to clover, barley, oats, and a small piece of wheat. The result in all cases is the same, the plants are full of Hessian Fly in all stages, from the tiniest mite to the flax seed state. I have also found another insect, a sort of buff colour, with legs and a proboscis, with which it probes the plants, and any plants that I have seen attacked are doomed. The Hessian Fly is so numerous this year that I have counted as high as fifteen clustered in one stalk. Yesterday, my interest in this subject being aroused, I inspected many fields which had been sown on or about August 31 up to September 29, and I find them all thoroughly infested, and to such an extent that I think the most advisable course will be to plough them under and sow a spring crop. You could do agriculturists a signal service by collecting evidence of the extent or area covered by this pest, and by giving the results publicly in the press, describing the habits of the fly, and particularly how often reproduction takes place. By doing this, farmers would be in a position to judge of the advisability of leaving their fields, or of ploughing up and resowing with oats or some other spring crop. It would also give them an opportunity to provide seed, which is at a late date, like spring ploughing, for instance, both difficult to get and often dear.'—John C. Wallis.

'Binbrook (Wentworth Co.), Ont., December 4.—I mail you to-day two samples of fall wheat, one sown on September 10, and the other September 13. They are both of the same variety, Long Amber. This is a fair sample of the wheat in Wentworth county.'—E. J. Duffy.

The samples sent were found to be pretty badly infested with puparia of Hessian Fly. In the first parcel of 22 plants, 3 of them were crowded with flax seeds, but 19 were uninjured. In the second parcel, 12 were infested and 14 uninjured.

'Waterford (Norfolk Co.), Ont., December 3.—In the townships of Townsend and of Windham, the Hessian Fly will nearly ruin the whole wheat crop. My wheat is half dead now, but some of it has started up from the root again. I have counted as many as nine flax seeds on one stem. I sowed my wheat on September 19 and 20. I do not think there will be half a crop of wheat. Some farmers sowed earlier and some later, but their wheat is as bad as mine.'—William Schram.

Every plant sent with the above letter was heavily infested, and the roots were apparently quite dead, with no appearance of new shoots being thrown out, as in the case of the plants sent from the same place by Mr. Cowdry.

'Glencoe (Middlesex Co.), Ont., December 4.—The fall wheat is so badly killed that there is very little left. There will be hardly a field left by spring. I sowed my first wheat on September 14, and on the 18th I sowed another field. The field I sowed last is the worst I have, but it is a weak growing variety called Kansas Turkey Red. All the rest of my wheat is Dawson's. One of my neighbours sowed September 1; all is gone. Another sowed on October 1, and this is not affected so far as I can see, but it did not make much top. I was about 40 miles west from here, and I saw a great amount of the wheat affected. Some was not up which was sowed very late. I sowed a field for one of my neighbours on September 19 on a gravelly loam. There is not a single green leaf left in the field. I notice that there is a little more greenness on the heavy clay than on the loam, gravel or sand. We had no frost until very late this year.'—James Glasgow.

The samples sent by Mr. Glasgow were all badly attacked, and about equally, by the Hessian Fly (every specimen of which was in the flax-seed state) and by the Wheat-stem Maggot (*Meromyza americana*, Fitch), all in the larval state.

It will be seen from the above letters, which cover all the points brought forward in other letters, that there are two features about this year's attack by the Hessian Fly which are unusual. In the first place, the severity of the outbreak, accompanied by a remarkable number of puparia in each stem, and the late date at which the flies were active and laying their eggs this autumn, thus necessitating at least a delay of one week more beyond the usual date recommended for safety, viz., the third week in September, before it will be safe to sow fall wheat and have it free from the attack of this enemy. From correspondence and a personal investigation of the fields in the Niagara Peninsula made early in December, this year, it was apparent that late sowing was attended with very beneficial results. Owing to the open and mild autumn this year, it was possible to sow later than usual, and several fields sown in the beginning of October were much freer from attack than those which were sown at what was considered to be the proper time, namely, the end of August or the beginning of September.

For many years previous to 1899 the Hessian Fly has done very little harm in Canada to fall wheat, and as a result of a great many experiments which are being carried out every year by the members of the Ontario Experimental Union, and other progressive farmers, it had become well known that the best crops were reaped from fall wheat sown at or before September 1. This, therefore, had given rise to the opinion that the proper time to sow fall wheat was at or about the date mentioned. This, however, is only true in such seasons and localities as the Hessian Fly and Wheat-stem Maggot are not abundant; but in periods when these two serious enemies increase, as has been the case during the present season and last year, it will be found that the proper season to sow fall wheat and rye is subsequent to the time when the egg-laying females of the autumn broods of both of these insects have disappeared. For a year or two, at any rate, it will certainly pay farmers to acquaint themselves better with the life histories of these insects and the remedies which have been found successful in preventing the losses due to their attacks.

The life history and the remedies for the Hessian Fly have been frequently given in the reports of this Division, and were fully treated in last year's report, but it may be well here to again give a short synopsis of these.

Attack.—In autumn a few small whitish maggots, oval in shape, generally showing a green stripe in the centre, may be found in the root shoots of fall wheat. Later these harden and turn brown, when they resemble small flax seeds. During May and June of the following spring, the so-called Hessian Flies, small blackish midges, with smoky wings and about $\frac{1}{8}$ inch long, appear and fly to the fields of growing wheat, where they lay minute reddish eggs, singly or in small clusters, on the upper sides of the leaves. The young maggots, after hatching, work their way down inside the sheaths of the leaves and feed at the bases of the joints. The presence of the puparia, or flax seeds, can usually be detected by the breaking down of the stem at the point where these occur, owing to the weakening of the stem by the attacks of the maggots. The flies from this summer brood appear in September and lay their eggs upon the leaves of the young fall wheat. This is called the autumn brood, and is the one which has done so much harm this year.

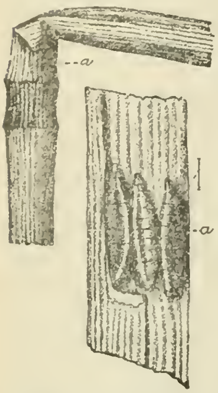


Fig. 2.—Hessian Fly; injured wheat-stem; three puparia enlarged.

Fig. 3.—Hessian Fly: puparia—natural size and enlarged.

Remedies.—1. Late Sowing.—The most important preventive remedy against injury by the Hessian Fly is the postponement of seeding until the end of September. By this means the appearance of the young plants above the ground is delayed until after the egg-laying flies of the second brood are dead. Where fall wheat has been sown in August, as is frequently done, the plants are well up and ready to receive the eggs of the flies when they emerge from the flax seeds of the summer brood. It is sometimes advised to feed off the green tops to a certain extent with sheep during the months of September and October, in which way it is claimed that many of the eggs are destroyed. I have never been able to prove that there is any advantage in this method other than giving a supply of good fodder at a time of the year when this is sometimes short. The chief objection to sowing so late as the end of September is that, as a rule, the plants have not time to make vigorous roots and tops so as to withstand the cold of severe winters. This, however, is seldom true, and in a great number of experiments, even at Ottawa, I have frequently found that good crops can be obtained from wheat sown much after the first of October, and while the Hessian Fly is abundant I believe that it is the very best policy for farmers to sow their fall wheat rather by the first of October than by the first of September, for although they may get a slightly smaller yield, it is better for them to be content with this and to be sure of it, than, in the effort to get a bigger crop, perhaps run the risk of losing half or even more from the attacks of the Hessian Fly. On this question of the proper time to sow fall wheat, the following from Prof. F. M. Webster, the State Entomologist of Ohio, who for a great many years has made a special study of the Hessian Fly, is of interest :—'I think the proper time for sowing fall wheat is late September. Early sown wheat will surely invite the attacks of the fly, and, while in years when this is not abundant the wheat may go into winter in better condition than that sown later, I believe that ordinarily this will not be the case. Your idea of choosing vigorous growing varieties and sowing late, on land prepared in the best possible manner is, to my mind, the right one. I think that in fall wheat the spring brood of Hessian Fly generally selects the younger tillers. I have observed in many cases that at harvest, what from appearances seemed to be tillers that had made the least growth in the fall, were attacked by the fly in the spring and another stem had been formed. Still, I do not think that any fixed rule can be laid down with regard to this. I believe that the Hessian Fly in spring will lay its eggs upon any stem or tiller that promises a good food supply for the young.'

2. Burning Refuse.—Many of the flax seeds of the summer brood are carried with the straw, and at threshing time are dislodged and fall down with the rubbish beneath the machine or are left in the straw. All dust and screenings should, therefore, be carefully destroyed, and all straw and small seeds should be either used during the winter or burnt before spring.

3. Treatment of Stubbles.—Most of the puparia of the summer brood are placed so low on the stems that they are left in the stubble when the wheat is cut. A large proportion of these give forth their flies in September, but some pass the winter in the stubble. An effective way to destroy these puparia is to plough down the stubbles deeply as soon as possible after the crop is cut, so as to place the insects so deep beneath the earth that the delicate flies, when they emerge, cannot reach the surface.

4. Trap Crops.—A method of reducing the numbers of the Hessian Fly, which is little practised, but which is spoken highly of by those who have adopted it, is the sowing of narrow strips of wheat in August, which will attract the females to lay their eggs, and which can afterwards be ploughed down. What is practically the same plan, is to run a harrow over fields as soon as the crop is cut, so as to start the volunteer crop from grain which has dropped in harvesting and induce a growth of wheat on the field sooner than otherwise would be the case.

5. Fertilizers.—When it is found that a young crop of fall wheat is only lightly infested, it is sometimes possible to stimulate the growth of the plants in spring by making a light application (so as not to cost too much) of some quick-acting special fertilizer such as nitrate of soda.

In cases such as we have many of in our fall wheat fields this autumn, where the attack is irregular in its occurrence, it will frequently be rather a difficult problem for a farmer to decide what his wisest course is. When, as is generally the case, there are patches in a field which have been destroyed, it is desirable to save such parts of the field as are uninjured. These patches can be sown in spring to some crop which will not require cultivation during growth, e.g., an early ripening barley, which can be cut at the same time as the fall wheat and the whole threshed as mixed feed. If, however, it is necessary to save the wheat separately, peas may be sown on these patches, and either the peas can be cut after the wheat, or the grain can be separated after threshing. In cases of bad infestation it would sometimes pay better to use the land at once for some other crop. It will, however, be necessary to replough the land deeply so as to bury the flax seeds too deep for the flies to get out, and then lay their eggs for the summer brood on spring wheat or the remnants of the crop of fall wheat. Unfortunately, the usual practice is merely to cultivate deeply, so as to produce a good seed bed. After reploughing, any crop may be sown except spring wheat. Barley and rye are also sometimes liable to attack, consequently other crops are preferable to barley or spring rye, such as oats, peas, corn or roots. There will also sometimes be cases when the farmer is uncertain what it is best to do, owing to the occurrence of uninjured patches in an otherwise badly infested field. In these cases, it will be best to wait and see how the wheat will turn out. If at last something else has to be substituted as a crop, probably the best returns will be obtained by sowing early-ripening corn, where a cultivator can be used, or early peas, where the patches are surrounded by wheat. Both of these crops may be sown as late even as the middle of June, and will usually give good results.

In the summer of 1899, as recorded in my last report, there was a remarkable outbreak of the Hessian Fly in the spring wheat crop throughout Manitoba, amounting to from 5 to 25 per cent of the crop. It is satisfactory to be able to record that there has been no recurrence of this outbreak during the past season. Mr. Hugh McKellar, Chief Clerk of the Department of Agriculture, writes under date December 18: 'I have much pleasure in advising you that this department did not receive any information this season, of the presence of the Hessian Fly in any part of the province.'

WHEAT-STEM MAGGOT
(*Meromyza americana*, Fitch).

Although the injury by this insect is not known to have been very serious during the past season, specimens have been sent in from a good many different places. It has been found attacking fall wheat in western Ontario in company with the Hessian Fly. The larger number of complaints and inquiries have come from Manitoba, and the North-west Territories, where the 'dead heads' caused by the summer brood had attracted attention and were thought by many to be the work of the Hessian Fly. The remedies for the Wheat-stem Maggot are practically the same as those for the Hessian Fly.

THE WHEAT-STEM SAW-FLY
(*Cephus pygmaeus*, L.).

This insect was reported from a few places in the North-west Territories during the summer of 1900, but no widespread injury was attributable to its attacks. Specimens were sent in from three places, and I have to thank my correspondents for taking a great deal of trouble in securing specimens and information concerning this interesting insect, which in any year may develop into a serious pest. A pretty full account of the insect and its life history was given in my report for 1896, when the most serious attack which has yet been recorded in Canada, was reported upon. This was at Souris, Man., on the farm of Mr. William Wenman. Mr. G. S. Tuxford, of Buffalo Lake, near Moose Jaw, Assa., has reported every year since then on the occurrence of the insect, and this year reports a serious outbreak, as follows :—

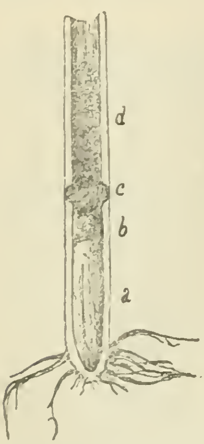


Fig. 4.—Wheat-stem Saw-fly ; *a*, cocoon; *b*, borings.

'Buffalo Lake, Moose Jaw, August 9.—Last summer I wrote you that there was not much sign of the Wheat-stem Saw-fly. Later I had to write again saying that some fields were rather badly attacked. This year, in our immediate neighbourhood of Buffalo Lake, the pest is assuming very serious proportions. We have just started wheat-cutting, and some fields especially all along the outside have from 20 to 40 per cent cut off and lying down. Our grain is ripening very rapidly this year ; a great deal is dead ripe now. We had four heavy rains on the 5th, 6th, 7th and 8th instant. Crops are from good to very good, though some fields sown on stubble will not give more than ten bushels to the acre.'

'September 18.—I have been trying to find some more stubbles in which the grubs of the Wheat-stem Saw-fly were hibernating ; but, owing to the early harvest, the late date of your request, and the many heavy rains, I find after many searches that it is impossible now to find any. At the end of July and early in August, it was very easy to trace and unearth the grub. I am sending you, however, a number of samples of the cut-off stems and heads. This is the same pest I complained of in the fall of 1897, and of which I then sent you samples. I remember you then advocated as one remedy, burning the stubbles in the fall. As the grub retires below the surface, would not this still leave it untouched ? It would be very difficult to get over a large area of ground by fall ploughing out here where the fall is so short.'—Geo. S. Tuxford.

It will be remembered that all wheat in the North-west is spring wheat.

The early date at which this wheat was ripe, August 9, was doubtless due to the dry hot season. This also accounts for the small yield mentioned by Mr. Tuxford, of fields sown on stubble. The advantage of sowing on land summer fallowed, as a means of retaining moisture, was very marked in the West last season. The injury by insects to an infested field being most severe on the outside, is not an unusual circumstance and merely shows the readiness with which flying insects settle down and deposit their eggs when suitable food for their young is found.

The work of the larvæ inside the stems sent from Buffalo Lake was plainly noticeable, and the Wheat-stem Saw-fly was undoubtedly the cause of the stems being cut off.

As pointed out by Mr. Tuxford, the larva does burrow down very deeply into the base of attacked stems ; but I think that the burning over of stubbles will be found a very useful remedy against this insect. Fall ploughing in most seasons in the West is difficult, owing to the lack of moisture; but where the Wheat-stem Saw-fly has been abundant, it is important that wheat should not be sown on stubble land unless a good burn has been secured, and if possible the land should be ploughed deeply either in fall or spring. Summer fallowing every other year as is done by many farmers at Moose Jaw, and doing the work early, before the middle of June, will do much to control this insect.

'Cottonwood, Assa., August 13.—Can you tell me the cause of my wheat being cut down in this way? As you notice, it is fully ripe. It was grown on summer fallow. We have had heavy rains lately, which probably accounts for so much being broken down. I shall be grateful for any information which will help me to destroy this grub.'

'August 31.—I undertook the search for the specimens you asked for, this afternoon, and although there were any number of cut-off wheat stems scattered on the field it was difficult to locate the lower end, as nearly all seemed to be gnawed off at a level with and sometimes below the ground.'—Harold D. Buchanan.

The wheat here referred to was injured by the larvæ, and was merely broken off by the wind and rain. The stems were cut off mostly at the surface of the ground, and the larvæ would have been destroyed in these instances by burning over the stubble.

'Osler, Sask., August 7.—In searching for more specimens of the swollen stems which we have been communicating about, I found to-day one fallen straw in which there was a small worm about $\frac{3}{8}$th of an inch in length; it was at the broken point, but immediately below the joint, with no appearance of a swelling on the stem. I think this is a different trouble from that which causes the swollen stems.'

'September 15.—I was much interested to hear that you had found a specimen of the Wheat-stem Saw-fly larva in the wheat straw I sent. However, I do not think it can be at all prevalent here; for, while searching around so much for the swollen stems which I sent you at the same time, this was the only specimen I found which showed any trace of the work of an insect.'—Percy B. Grant.

Remedies.—The means which are to be recommended for checking the increase of the Wheat-stem Saw-fly are : The burning over or ploughing deeply of all stubbles, also burning of such straw as is not used by the following spring, and summer-fallowing in June every other year.

Undoubted specimens of Wheat-stem Saw-fly were sent with the above letters, but some other correspondents who wrote of this insect were mistaken as to the identity of the insect they complained of.

Injuries to Wheat due to Weather.

There were several curious conditions of wheat in the West last season, which can only be accounted for by unusual climatic conditions, chiefly the excessive drought, accompanied with great heat and bright sunshine in the last days of June. The ears of wheat were scalded just as they emerged from the sheath or just inside it. Shade trees which had been planted for several years were also severely injured by this unusual heat. The thermometer along the Canadian Pacific Railway through Manitoba and westward as far at any rate as Regina, registered 98 to 106 and 107 degrees Fahr. in the shade on the three successive days June 28, 29 and 30. Spruce trees planted at various places were turned chocolate brown on the sunny side in one day, and many kinds of plants suffered severely. The injury to wheat was curiously local, but I cannot discover any other possible reason for the aborted and scalded heads in some places. Very interesting specimens were sent in by Mr. Geo. Wise and Mr. W. S. Wallace, of Shellmouth, Man., with a complete account of the injury and its occurrence on various soils and under different exposures. The affected area was eight miles long, north and south, and one mile wide. The injury to the ears was such that no theory could satisfactorily account for it, the ears being blighted and shrivelled up, sometimes at the tip, most frequently at the base, five or six florets being whitened and empty, and sometimes in the middle, with good grain forming at the base and at the tip. Frost and heat would either of them account for some of the characteristics, but not all. The injury lasted a very short time, and the chief peculiarity was that in adjoining fields grain at the same stage and apparently under exactly the same conditions was uninjured. Another curious distortion of stems of wheat plants was shown to me at Osler by Mr. Percy B. Grant, in which the stem was swollen, hardened and thickened, and as a rule bent rather abruptly so as to burst the sheath just above the top node of the stem. This attack resembled closely the work of the Joint-worm *(Isosoma)*. Mr. Grant wrote after considering the matter carefully and examining many specimens: 'My opinion of the matter is that the trouble is an excessive growth induced by the moist weather which came after a prolonged period of exceedingly dry weather.' I quite agree with Mr. Grant in this opinion, and so also do other botanists to whom I have shown the specimens.

'Osler, Sask., September 5.—I am sending you to-day a bundle of about 20 more or less injured stems ; all of these I cut off as near to the ground as possible, and all were standing except those which had broken at the injured points and fallen over. They show the swelling of the stem in various stages. I never saw this injury to wheat until this summer. Beginning with the middle of the month of June we had a spell of exceedingly hot and dry weather; the heat and drought gradually increasing till the end of the month, when nearly all the grain was out in head, although the straw was only from 6 inches to a foot high. Large patches of stubble land were materially injured by the want of moisture and, had the drought continued much longer, the bulk of the crop would have been ruined. However, about July 1, heavy rains set in, and there was an excess of moisture for nearly all the month. There was plenty of warmth in the ground, which, together with the moisture, pushed forward the growth at a rapid rate. The injured fields recovered rapidly, and those which had held their own during the dry spell sent up a rank growth. About a week after the rains began, numbers of the wheat stems were noticed to be lodged. The lodging continued for about a week and then stopped. The amount was variously estimated from one-twentieth to one-tenth, according to the field, being worst on new land (breaking) and least on summer fallow. The lodging was worst in the rankest spots of any particular field. It was always the largest stems with the largest heads which lodged. On closer examination, I found large numbers of stems still standing with the stems much swollen above the joints, and I noticed that the lodged stems were also swollen and had broken at the most distorted point. The swelling sometimes spread several inches up the stem, but in most cases was confined to one point until the stem bulged out so much that the sheath was burst and the inner stem protruded so much as to bend almost at a right angle, when it broke and was blown over by the wind. I found no lodged stems which did not show the swelling. The swollen stems which did not lodge were perhaps a little later in maturing than the rest of the crop.'—PERCY B. GRANT.

CUTWORMS IN WHEAT.

There was rather a serious outbreak of some kind of cutworm which attacked wheat fields in Manitoba. I was informed by the Department of Agriculture for that province, at the end of May last, that a great deal of harm had been done in the

Stonewall district. From Stonewall to Teulon it was reported that very few farms had escaped entirely, and in many cases the loss was serious. Mr. Arch. Woods, who lives about 2½ miles south of Teulon, had one field of 23 acres of wheat on summer-fallow three-quarters destroyed. The worms were said to clear the crop out completely, leaving the field as black as before it was sown. Mr. C. C. Castle lost 15 acres in the same way, and Mr. Mudd and other farmers in the same locality suffered to a similar extent. The caterpillars were almost full grown on May 19. Unfortunately no specimens of these cutworms were sent to the Division, so the species could not be identified with certainty. The Red-backed Cutworm *(Carneades ochrogaster,* Gn.) was abundant in Manitoba last summer, the caterpillars attacking turnips and many other low plants. The Rev. W. A. Burman reports injuries by this species at Deloraine, and Mr. A. W. Hanham informs me that this was the commonest moth at Winnipeg in the season of 1900. I have never actually detected this species attacking wheat ; but it is a well known pest of Indian corn, and it is quite possible that it may have been the culprit on this occasion.

GRASSHOPPERS IN MANITOBA.

About May 20 reports began to come in on the abundance of various kinds of grasshoppers in Manitoba, and by the end of the month the injuries had assumed serious proportions. An urgent invitation was received from the Provincial Minister of Agriculture for me to visit the districts and advise farmers. Unfortunately previous official engagements rendered this impossible until the end of June, when I proceeded to Winnipeg, and in company with Mr. Hugh McKellar, the Chief Clerk of the Department of Agriculture, visited a portion of the infested district. Through the courtesy of the Canadian Pacific Railway free transportation was provided to any part we wished to visit. Accordingly, leaving Winnipeg on July 2, we proceeded to Stockton on the Glenboro' Branch of the Canadian Pacific Railway, and then drove through the country worst infested round towards Wawanesa, Treesbank and Aweme, where we spent the night, and were hospitably entertained by Mr. Criddle, and where we received much valuable information and saw most interesting specimens of natural history objects. Leaving there the next morning, all too soon, we passed on to Douglas, another point where much harm had been done by locusts. In the afternoon a circuit was made round this place for several miles north-east and south-east. The next day I went on towards Brandon. The places in Manitoba where considerable injury was reported to have been done by locusts were along the line of the Canadian Pacific Railway from McGregor past Melbourne, Carberry, Douglas, Brandon and Oak Lake to Routledge, and south by Pipestone, Lauder, Hartney, and following the Souris river to Glenboro' and thence north-easterly to McGregor. At the time of my visit the grasshoppers were enormously abundant, but all farmers agreed that there was not at that time one where there had been one hundred a few weeks previously. I found every one well acquainted with the habits of the insects and the chief methods of fighting them. The article in my report for 1898, where all the best remedies are given, had been read carefully, but the greatest credit is certainly due to the Provincial Minister of Agriculture and his energetic Chief Clerk, Mr. McKellar, who had spared no effort in distributing information through the press, by holding meetings and circulating leaflets of use to farmers in meeting this outbreak. The farmers had responded promptly and had followed instructions well, by destroying the young insects both by burning them at night when they had collected on rows of straw spread across fields for the purpose, ploughing down stubble fields, the use of hopper-dosers, large numbers of which could be seen in all parts of the country, and by poisoning the insects with a mixture of bran and Paris green. There

Fig. 5.—The Rocky Mountain Locust.

is no doubt that the efforts put forth at this time had a very appreciable effect upon the numbers of the locusts, and much good was done in reducing the numbers during the hot dry period which prevailed throughout the month of June. The importance of ploughing down all stubble this autumn or next spring was impressed upon farmers by the Provincial Department of Agriculture, so as to complete the work of fighting the grasshoppers which was so well begun last spring. It will be noticed that the area infested this year was not the same as that which was invaded by locusts north of the Turtle Mountains during the two previous summers. A comparative freedom of those localities in southern Manitoba must be attributed, I believe, to the good work done by farmers last year. This serious outbreak was, no doubt, very much aggravated, if not entirely caused, by the dry hot season, which not only checked cultivated crops, but almost entirely prevented the growth of vegetation on the prairies. The only green thing for the grasshoppers to feed upon was the young and half-starved crops on cultivated land. Seeing the hundreds of acres in some places swept bare, I expected to find large swarms of the Rocky Mountain Locust *(Melanoplus spretus*, Uhler*)*, but at only one place was this insect detected, and this was at Douglas. The species which were almost entirely answerable for the destruction of crops in Manitoba in 1900, were the native species *Melanopolus packardii* (Scudd.), *M atlanis* (Riley), and *Camnula pellucida* (Scudd.). These were almost in equal numbers throughout the districts mentioned, and probably the first named was responsible for the larger proportion of the injury, being a large species somewhat like the well known Two-striped Locust, but more active. It is easy to distinguish the species by the broader margin to the thorax and its bright blue tibiæ or shanks. There were many other parts of the West where grasshoppers were more than usually abundant, as is generally the case in dry seasons, but complaints were not made of their attacks on crops.

The following report from Mr. Norman Criddle, of Aweme, Man., gives a concise account of the outbreak at that place, which was one of the centres of worst attack.

'Aweme, Man., December 22.—With regard to the locusts, I forward some extracts from my note-book which may be of use to you. There is no doubt that the poisoned bran was far superior to anything else we tried. It was first used here with success by Mr. Harry Vane of this place.

April 24.—Locusts began hatching.

May 8.—Bulk of locusts are hatched.

May 14.—Several fields cleared off. Still hatching. H. Vane has tried Paris green with some success. Large numbers were ploughed under on edge of fields during night.

May 19.—Found a locust killed by Tachina flies; seven grubs found in ground beneath it.

May 24.—Locusts rapidly eating wheat.

May 25.—Locusts beginning to fly.

May 29.—Seem to have done hatching ; are not doing as much damage as formerly. H. Vane has invented a machine somewhat similar to the 'hopper-doser,' only longer. It is made of sheet-iron and burns wood. With this and a mixture of Paris green and bran, the locusts are being kept under control.

May 30.—Hopper-dosers are being used at most places with some success, though not much.

May 31.—We are using Paris green bait with great success ; we are spreading it round all the fields.

June 6.—Half the locusts can fly.

June 7.—Still a few locusts hatching. Large increase of Tachina flies in some places.

June 12.—Several people report locusts killed by Tachina flies. H. Vane reports large numbers dead and dying from Tachina flies, two miles west. There are very few here killed by them.

June 20.—Locusts have been flying south-east (with the wind) in large numbers. These were : *M. spretus* and the Lesser Migratory ; quite a lot crossed the river.

June 23.—Lots of locusts leaving. They go with every puff of wind.

June 27.—Locusts have nearly all disappeared. A tremendous lot are dead round the field, killed by poisoned bran. They can be picked up by handfuls.

June 28.—Locusts have ceased to do damage. Most of them have disappeared.

August 24.—There has been a slight migration of locusts into this part the last few days. They were of the two migratory kinds, and came from the south-east.

August 30.—There is hardly a locust to be seen.

'The mixture of Paris green mentioned above is made as follows : One part Paris green, one part salt (the locusts will not eat it without), and eleven parts of bran. Mix into a mash, adding as much water as the stuff will hold. Spread in as small lumps as possible. We generally use a trowel or thin piece of iron. Get a little of the mixture on the edge and then fling so that it will spread some 15 yards. A pound of Paris green should make enough mixture to spread a strip two miles long by 15 yards wide. Fresh stuff should be spread every two days. The poison takes from two to five days to kill the locusts, so that they are able to fly long distances before they die. They eat it much more ravenously when they are full-sized than they do when young. Everybody who tried this remedy now swears by it ; several of them were heard to say that they will never fear locusts again. I only saw one locust attacked by a hair worm ; this was about 11 inches long, and was seen in July.

'No locusts were seen to lay eggs, nor have I been able to find any eggs in the ground. Those that did most damage were Nos. 7, 11 and 13 of those I send ; the damage done by them was about even. (They are probably the same, M. *atlanis,* Riley).

'There was also a small percentage of *M. spretus*, which you identified when you were here. I saw several cases of *M. spretus* mating with *M. atlanis* (No. 11). This was noted during the migration south-east on June 20, 21, 22 and 23. During this time they got vastly thicker where before there had been very few.

'The damage done here was greatly over-rated. We lost some 50 acres out of 260, and our fields were the first attacked. Other people lost perhaps a little more which was because they did nothing to stop the advance. The locusts had been increasing here for about three years, in fact, considerable damage was done in the latter part of 1899.'

The grasshoppers certainly were answerable for much loss ; but, as compared to the rest of the province, the area where their depredations were of a serious nature was not very large. Many causes added to the loss, which at the time was generally all attributed to grasshoppers. Drought, frost, wind and gophers all did their share of the injury, and as the species most concerned were native species which occur on the prairies in some numbers every year, it is to be hoped that this was merely an exceptional outbreak of local species, which will not recur next season. The probability of this recurrence is certainly rendered less probable by the work which has been done this autumn in following out the wise suggestions as to ploughing, which have been made by the provincial Department of Agriculture.

The two most abundant species throughout the province of Manitoba were *M. atlanis,* the Lesser Migratory Locust, and *Camnula pellucida,* the Pellucid Locust.

These two latter species occurred also in considerable numbers in the Okanagan valley, in British Columbia, where bunch grass pasture lands and grain crops were reported to be seriously affected.

WHITE GRUBS ATTACKING WHEAT.

The White Grub, the larva of the June beetle *(Lachnosterna)*, is a frequent enemy of pastures, and also occurs, as is too well known, in gardens as an enemy of the strawberry, and occasionally in farm lands is a destructive pest in corn fields. This year an attack of some importance on fall wheat was brought to my notice.

'Tancred (Lambton Co.), Ont., October 10.—The White Grub is eating out the fall wheat in this locality, especially on land that is inclined to be sandy. A year ago last spring the June Bugs or Beetles were so bad that my small plum and cherry trees were nearly destroyed by them. I was in a great quandary to know how the young foliage was being destroyed ; not a leaf was allowed to grow until long after other trees were in full leaf. I examined them carefully every day, but not a sign of insect life could I find, until one night I was going to the stable with a lantern, and the thought occurred to me, I'll look at the trees and see if I can find any insect working by night, for I knew the trees, which were two years old, should be exceedingly healthy and thrifty. To say I was surprised at what I found is putting it very mildly. Every twig and limb was one mass of crawling June Beetles. I prophesied a full crop of White Grubs last spring, and sure enough we got them.'—T. H. MYERS.

Unfortunately, very little can be done when White Grubs are found attacking a crop. When the beetles attack fruit trees, spraying the foliage with arsenical poisons will destroy large numbers, and when the White Grubs are found destroying the grass on lawns some good may be done by spraying the grass freely with kerosene emulsion and then washing it in with water. The eggs of the June Beetles are laid in spring, and the young grubs hatch soon after, but do not attain their full growth till the middle of the next summer. They then change to pupæ, and soon afterwards into the perfect beetles, which, however, do not emerge until the following spring.

THE PEA WEEVIL OR 'PEA BUG'

(Bruchus pisorum, L.).

Attack.—A small, brownish-gray, very active beetle, one-fifth of an inch long, with two conspicuous black spots on the end of the body, which emerges from seed pease in autumn or in spring, leaving a small round hole. The insect is generally spoken of under the incorrect name of 'pea bug,' and infested pease, as 'buggy' pease. The egg is laid on the outside of the young pod, and the grub on hatching eats its way in and penetrates the nearest pea. Here it remains until full grown, consuming the interior of the pea and passing through all its stages, from a white fleshy grub to the chrysalis, and then to the perfect beetle. Some of the beetles, the percentage varying with the season, escape from the pease in the autumn and pass the winter hidden away under rubbish or about barns and other buildings. The greater number, however, do not leave the pease until the following spring, so that they are frequently sown with the seed.

Fig. 6.—Pea Weevil.

The perfect insects fly easily and resort to the pea fields about the time the blossoms appear. They have been observed feeding upon the leaves and flowers of the pea vines before the pods were formed, but the injury so done is inappreciable compared with the greater loss from the injury to the seeds by the grubs.

The injury by the Pea Weevil during the past season has been very serious indeed, and I wish to impress upon all pea growers in the districts where this insect prevails, the importance, or even necessity, of making a united effort to decrease this great annual loss by adopting some of the well known methods for the destruction of this pest.

The following are extracts from one or two of a great many letters on this subject:—

'Ottawa, November 26.—During the month of August I made a bicycle tour through the counties of Peterborough, Ontario, York and Brant, Waterloo, Wellington, Oxford, Perth, Middlesex, Lambton, Huron, Bruce, Grey and Dufferin. During this trip I paid considerable attention to the insect enemies of farm crops, and discussed the matter with many farmers. From my observations, I do not hesitate in saying that the Pea Weevil is the most important pest with which the farmers in the counties mentioned have to cope. I believe that the losses sustained in the province of Ontario from this enemy are such as should direct more attention to the methods of reducing or even exterminating this insect. In talking with farmers, even where the weevil has been present for a number of years, I found that neither the habits of the insect nor the proper methods of fumigating were very well understood. Farmers who a few years ago grew every year 20 to 30 acres of peas have become so discouraged that 5 or 10 is about the acreage they now grow, and many have dropped peas altogether out of their rotation.'—G. H. Clark.

'Vellore (York Co.), Ont., August 15.—The Pea Weevil is unusually bad this year. A large percentage of the pods have every kernel punctured, and some kernels have two insects in them. Last year, in early-sown field-peas, the bugs matured very early, and at threshing time, shortly after the harvest, they were in swarms in the barn, and the men were covered with them. It was an unusually hot season, with continued drought, which, I presume, hastened the development. Late sowing may result in fewer weevils, but this method is invariably disappointing in the yield and quality of pease. Many people sow one field from year to year, but they always depend upon the early ones for the best quality of pease and straw. A heavy crop of peas has the same beneficial effect upon land as clover, but to a less degree. This result is very apparent on heavy clay lands. The much easier preparation of pea stubble for wheat-growing is of great importance to those who make a specialty of wheat, and as wheat usually does better on pea land than on other stubble, farmers cling to pea growing for the above reason, which, in my opinion, is a very good one. I have told many farmers of the plan of fumigating with bisulphide of carbon; but, when extra trouble and cost as well as some danger are entailed, it seems next to impossible to get farmers to take hold of this; if, however, you could devise some method by which public exhibitions could be given, for instance in properly fitted-up railway cars to be moved from place to place, in which farmers could have their pease treated at a small cost, I think they would soon learn the value of this method, and if it were done for one season, there would be a general clamouring for more of it the second year. A couple of years in any district would so thoroughly demonstrate the benefits as to make it become a recognized duty of every pea-grower to treat his pease, and with this united action much good would result.'—John Lahmer.

'Waterford (Norfolk Co.), Ont., November 7.—There seem to be few Pea Moths here, but the Pea Weevils are very nearly equal in number to the pease.'—N. H. Cowdry.

'Belmont (Middlesex Co.), Ont., December 4.—Pea Weevils have done much harm. If a farmer treats his own seed pease with carbon bisulphide, unfortunately that does not prevent the weevils from his neighbours' fields from injuring his crop. There cannot be much good done unless we can in some way get united action. I am preparing to sow 12 acres of sod with peas next spring, for there is nothing like the pea-vine to thoroughly kill out the grass of a sod field. Before receiving your letter I had already planned to treat my pease next year. Pease should be threshed as soon as ripe and immediately treated, before the weevil has attained full size or done much damage. If stored away in a barn and threshed in October, the bug has made its full growth and the damage is done.'—H. PETTIT.

There are many valuable suggestions in the above letters, and I am convinced that if pea-growers on a large scale, as well as those who only grow a small quantity for their own use, would regularly fumigate with carbon bisulphide, in a very few years this united effort would have an appreciable effect on the unnecessary loss which occurs every year in this important crop. I believe that most farmers in the districts where the Pea Weevil occurs are pretty well acquainted with the life habits of the insect, and also know that the fumigation treatment is effective. By following the instructions which have been frequently given, and which are repeated here, there is really very little danger; but of course the work must be done with care. Most of our large seed-growers and seed-dealers do regularly treat their seed, but I think a change for the better might be made by doing this work earlier. Not only is the carbon bisulphide more easily vaporized in hot weather, but its effect on the insects is much more fatal than in cold weather or later in the season, when the weevils are in the torpid state in which they pass the winter. The sooner the fumigation is done after the pease are ripe, naturally, the less the seeds will have been eaten away by the grubs and injured. Moreover, by postponing the fumigation until late in the autumn, in some seasons a large proportion of the weevils will have left the pease and escaped before the operation.

Any farmer can treat his own seed easily and with perfect safety in the following way: Place the quantity of pease to be treated in an ordinary 45 gallon coal-oil barrel, which will hold about five bushels of pease. The quantity of carbon bisulphide which has been found necessary to destroy the weevil is one ounce to every hundred pounds of seed—the treatment to last for 48 hours. Therefore, for the above quantity, as pease weigh from 60 to 65 pounds to the bushel, 3 ounces would be required if the barrel were filled. The chemical may be poured right on to the pease, and the barrel must then be covered quickly and closely, first with a thick cloth or canvas which has been damped in water, and then with boards. The carbon bisulphide will not injure the seed in any way, either as to vitality or as to its wholesomeness as food. Carbon bisulphide is a colourless liquid which readily turns into vapour when exposed to the air, except in very cold weather. This vapour is quite invisible, but has a very strong unpleasant odour. It is heavier than air and therefore sinks quickly to the bottom of and permeates the contents of any closed receptacle in which it is used to free grain of infesting insects. It is, however, extremely inflammable both in the liquid and vapour form; consequently great care must be taken not to bring any flame, not even a lighted pipe or cigar, near the liquid or barrel during the treatment. The pease or other grain must be left in the tightly closed barrel for 48 hours to destroy the weevils; it will therefore be best to place the barrel in an outside shed at some distance from the living-house.

The late sowing of pease is certainly useful in preventing attack by Pea Weevil, but the method is not in much favour with farmers, because late sown peas in most seasons are liable to be so badly attacked by mildew as to reduce very much the value of the crop.

Holding over seed.—An easy remedy and an excellent one when only a small quantity of seed is required, is to hold over until the second year after harvesting. This must be done in close bags so as to prevent the escape of the beetle which naturally emerge before the end of the second season, and as they cannot perforate bags even when these are made only of paper, they must die; for, unlike the Bean Weevil, they cannot propagate in dry grain. The vitality of pease is not injured to any appreciable degree by this delay of one year before sowing. At the time of sowing the seed should be examined and if necessary hand picked: every grain which has been perforated should be discarded, as it has been proved that it is impossible to grow strong plants from weevilled pease.

The great need in Ontario to-day in this matter is concerted action among all concerned. If a few only treat their pease carefully, little good can be done in controlling this serious enemy, but on the other hand, it cannot be too often stated that, as is often averred by farmers, it certainly is not true that there is no use in one man doing what is right when others close at hand, do nothing. This is a big undertaking ; the Pea Weevil has now for many years been practically increasing year by year, and has now obtained such a foothold that it can only be controlled by stirring up public opinion to the extent of inducing everybody concerned to do something. As a means to this end, Prof. Lochhead, of the Ontario Agricultural College, makes the practical suggestion of bringing the subject prominently forward at the winter meetings of every farmers' institute in the province. This could be very easily done, the life history of the Pea Weevil is perfectly well known and has been published over and over again in official reports, both federal and provincial, as well as in agricultural journals. There is a competent staff of speakers for the farmers' institutes, and it would be almost impossible to hold a meeting in any of the pea-growing counties where there would not be several who could speak on this insect and its work, to the great advantage of many present.

There is, however, every necessity that those who discuss the matter, should prepare themselves beforehand and make it very plain which insect is being discussed. On frequent occasions when reports have been received from correspondents, I have to write to them before I can be sure which insect they mean. The Pea Weevil is the short, roundish, hard beetle which occurs. at the time when it is most often noticed, among seed pease from which it has emerged, leaving a perfectly round hole in the hollowed-out pea, in which it passed its preparatory stages. This insect is shown enlarged, and of the natural size at figure 6. The Pea Moth, as it is generally seen by farmers, is in the form of the caterpillar, usually called the 'worm,' in the pea pods, where the white caterpillars devour the green pease from the outside, leaving a ragged cavity and a mass of excrement. The perfect insect, the moth, Fig. 8, is very rarely seen. It resembles very much the Codling Moth, of the apple, but is of a general slaty gray colour instead of bronzy brown. The Destructive Pea Aphis is a soft-bodied green plant-louse, shown below, very much enlarged. These plant-lice cluster in enormous numbers at the ends of the shoots of peas, of all kinds, clovers and vetches.

THE DESTRUCTIVE PEA APHIS
(*Nectarophora destructor*, Jnsn.).

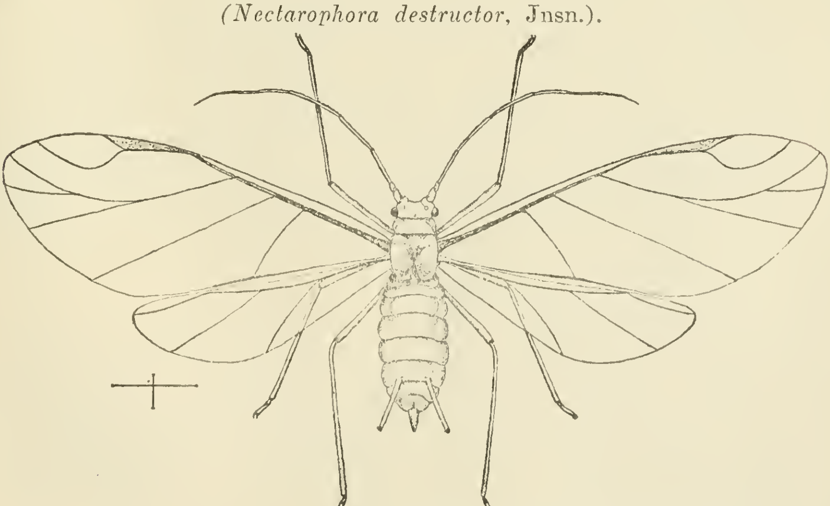


Fig. 7.—The Destructive Pea Aphis; winged viviparous female—enlarged.
(After Johnson, Md. Agr. Exp. Sta. Bul. 63.)

In my last report considerable space was devoted to the Destructive Pea Aphis, a new pest of the pea, of which no previous attack had been recorded in Canada. The injury extended from all parts of the Maritime Provinces, through Quebec to the western boundaries of Ontario, and the loss in many places was serious. Not only did it occur in Canada, but much greater injury was caused by it in certain of the United States, as Maryland, Delaware, New Jersey, New York, Connecticut, &c. Excellent work has been done upon this insect in Maryland by its describer, Prof. W. G. Johnson, and in Delaware, by Prof. E. Dwight Sanderson, both of whom have published bulletins on the subject.

In Canada during the past season, although the Destructive Pea Aphis has occurred throughout most of the districts visited by it last year, the numbers and injuries have been decidedly less. It has been discovered in the United States that this insect should perhaps be considered more particularly an enemy of clover than of peas. In Canada the species has been found only in small numbers on clover, and no perceptible harm has either been observed or reported to this crop. Wherever the Destructive Pea Aphis was observed, it was attacked to a very noticeable degree by parasitic enemies. All of the species mentioned in my last report were found during the past season in even greater abundance, and in addition to these with every outbreak the fungous disease due to *Empusa aphidis* was more or less prevalent. At Ottawa by far the most inveterate enemy of the plant-lice was the small orange larva of a species of *Diplosis* ; these minute maggots, about one-tenth of an inch in length, crawled about on the surface of the pea vines and worked very much in the same way as the larvæ of the *Syrphidae*, or Hover Flies ; creeping up to an aphis they transfixed it and held it up, raised from the surface, while they sucked out the juices of its body. The growth of these little creatures was very rapid and there were several broods in the season. When full grown these *Diplosis* larvæ spun a minute cocoon on the stem of the pea plant, or, falling to the ground, spun it there close to the surface, attaching several grains of sand to the outside. This cocoon closely resembles that of the Wheat Midge, or the tiny Cecidomyid *Lasioptera vitis*, of Osten Sacken, which emerges from the Grape Vine Tomato Gall. The winter is passed by the larva inside the cocoon. The plants most seriously attacked in Canada this year were late field peas, sweet peas in gardens and the new crop plant known as the Grass Pea, which is being grown in some districts on account of its exemption from the attacks of the Pea Weevil. Several occurrences of the Destructive Pea Aphis were watched from the time they first appeared this year at Ottawa, on July 27, until the time when permanent snow fell, and a few specimens were found on clover by digging up the plants from under the snow. Parasites of several kinds were abundant throughout the season, and a constant warfare was waged. No sooner did the aphis increase, and appear in large numbers than the parasites appeared in greater numbers and brought them down again suddenly almost to a point of total annihilation. However, at the end of the season a few specimens of the aphis could be found wherever there were chance seedlings of peas and upon late sweet peas, as well as the few mentioned above as found on clover. The attacks of this insect upon the plants where it occurs are of a very pernicious nature, the plants soon becoming stunted, and the flowers, if produced, quickly withering up. Sweet peas which were sown early and had made good growth stopped flowering as soon as the insects appeared, and late sown plants were dwarfed and made no further growth after the attack began.

Last year the worst complaints of injury came from the Maritime Provinces. This year Mr. Robertson, the Superintendent of the Experimental Farm for the Maritime Provinces, writes : 'The Pea Aphis began its work this season in Nova Scotia just about the same time as last year and it looked as if it was going to be just as destructive ; but for some unaccountable reason it disappeared all at once, though not until it had completely destroyed peas which were sown late or on poor ground, where they had a sickly growth to begin with. Such as had a strong and vigorous growth were not much hurt. I did not notice any on clover.'

The injury in Ontario is summarised in the following letter from Messrs. the John H. Allan Seed Company :—

'Picton (Prince Edward Co.), Ontario, November 19.—The Pea Aphis appeared in some portions of Ontario last year and more largely in the United States, and has done material damage to the pea crop. This season it has done considerable damage in New York State, Michigan and Wisconsin. Last season, as well as this, it caused injury in Prince Edward county, as well as in Lennox and Addington. We are also told that it did much damage in Renfrew county.'

The losses due to the Destructive Pea Aphis in the Atlantic Coast States have been shown by Prof. Johnson to be enormous, and he quotes from *The Trade*, a canned goods journal, published in Baltimore, the information that the crop of peas of the Atlantic coast this year will not exceed on the outside one-third of what it was even last year, and continues : 'This is about as serious as it can be, when it is taken into account that it is mostly due to this one pest.' . . . 'With this year's experience, however, we have shown conclusively in our experiments and practical work in the field that this insect can be kept in control to a very great extent if taken in hand in time. In the first place, the peas must be planted in rows 24 or 30 inches apart, and not broadcast or in drills, as is frequently the case.' Many remedies were experimented with by Prof. Johnson, and it was found that what he has called the 'brush and cultivator method' was the most effective remedy. For this it is necessary that the peas should be planted in rows as stated above, and when the insects are noticed the vines are brushed backward and forward with a good pine switch, in front of an Iron Age cultivator, drawn by a single horse. In this manner the plant-lice, which leave the vines quickly when these are shaken, were covered up as soon as they fell to the ground, and a large proportion of them destroyed. The operation was not repeated until the third day, as it usually required over 48 hours to destroy the insects when covered with earth. The particulars are given of an extensive experiment, where a 600-acre pea plantation was practically saved by the persistent and energetic efforts of Mr. C. H. Pearson, of Baltimore. All the methods from a practical standpoint were tried on this place, and it was found that the brush and cultivator method was the most effective. Forty men were engaged, and the 600 acres of peas were brushed and cultivated every third day for two weeks, and in this manner the entire field was saved, netting the owner from 25,000 to 30,000 cases of pease, of two dozen tins each. The year before the pease over the same area were broadcasted, so there was no opportunity of fighting the pest, and, as a consequence, 480 acres were entirely ruined. Another method which was tried with considerable success, consisted of a brush which dislodged the insects so that they fell into a pan containing coal oil and water, drawn between the rows of peas. In this way a bushel of plant-lice were caught to each row of peas 125 rods long. Spraying was tested after a thorough trial, upon 100 acres, and all sorts of insecticides for sucking insects were used, but this method of fighting the insect was abandoned, because no spray could be found which would destroy a large enough percentage of the insects to warrant the expense of the operation

THE PEA MOTH
(*Semasia nigricana*, Steph.).

This insect was unusually abundant in the provinces of Ontario and Quebec during the season of 1900. Prof. Lochhead reports it as troublesome this season in the northern counties of Ontario: Grey, Bruce, Huron, Perth, Dufferin and Wellington, but it does not appear to have been quite so destructive as usual in the Maritime Provinces, although inquiries have been received from all three provinces. Some experiments as yet incomplete may be reported upon provisionally, as they appear to be promising. Mr. J. E. Wetmore, of Clifton, King's county, N.B., was good enough, at my request, to try spraying the peas at the time the pods were forming, with the same spray of Paris green and water as is used for the Codling Moth. This experiment was suggested by the similarity of the habits of the Pea Moth and those of the Codling Moth, and although only two sprayings were given, the results were so promising as to show the importance of careful experiments being carried out in spraying peas to prevent loss from the Pea Moth. There should be at least three sprayings, the first applied when the blossoms begin to fall, the second one a week later, and the third ten days later again. As liquids will not adhere easily to such plants as the pea, owing to their waxy covering, it is necessary, after mixing the Paris green and water, 1 pound to 100 gallons, to add whale-oil soap, or some other soap, in the proportion of 1 pound to every 25 gallons of the mixture. Mr. Wetmore's report on the result of two sprayings, is as follows:—

Fig. 8.—Pea Moth: caterpillar and moth. 2 and 4, enlarged.

'Clifton, N.B., October 4.—I think that the injury to pease in this section was less this year than for a long time previously, and, therefore, it was not a very favourable year for the experiment. Early peas never suffer much from the Pea Moth, therefore I did not spray them, and they were not injured by the moth, except a few at the latter end of the pick. I mixed the spray as you directed and applied it with an Electric Sprayer, which only worked tolerably well. The first application was made on July 21, when the blossoms were beginning to fall from the pease, the second one on July 28. I did not spray again, as the pease were about ready for use, and I did not care to have the mixture on them. I gave the vines about the blossoms a good soaking. I picked the first pease for the table on August 1, half sprayed and half unsprayed, and found one caterpillar in each. August 11, tested pease again, but I could not detect any difference in sprayed and unsprayed pease. Very few pods were affected in either, not more than one in fifty. I examined them for moth several times after this, and found the number of affected pods increasing steadily in both sprayed and unsprayed towards the end of the season. There was, however, a noticeable difference between the sprayed and unsprayed at the end of the season, about 9 or 10 per cent of the sprayed pods were affected, while 20 to 25 per cent of the unsprayed were attacked. I also examined pease on my neighbours' plots and found about 25 per cent infested. This result was not entirely satisfactory to me, because the mixture failed to keep the moth off entirely, though the vines were well drenched.

'I do not think, however, that the moth always lays its eggs in the very early stages. I have found a number of very young grubs on pease ready for the table, though the majority were much older. In fact, I found all stages of growth at that period, from very young to big fat grubs.'—J. E. WETMORE.

THE VARIEGATED CUTWORM
(*Peridroma saucia*, Hbn.).

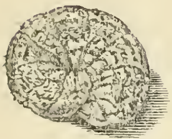


Fig. 9.

Fig. 10.

Fig. 11.

Fig. 9, The Variegated Cutworm ; Fig. 10, moth ; Fig. 11, pupa.
(All natural size.)

One of the most remarkable outbreaks of an injurious insect which has ever been recorded in Canada, occurred last summer on the Pacific Coast, extending from Oregon through Washington, and in every part of British Columbia from which reports have been received. The loss in all garden crops was enormous, and was due to the attacks of the caterpillar of one of the noctuid or 'owlet' moths *(Peridroma saucia,* Hbn.), which has been named somewhat inappropriately the Variegated Cutworm. The parent moth is known in England under the name of the 'Pearly Underwing.' Not only did this insect occur in disastrous numbers in British Columbia, but it was rather more than usually abundant in Manitoba and in Ontario. The first intimation of the outbreak was received from Kelowna in the Okanagan Valley, British Columbia, in a letter dated July 9; but every day after this for more than a month letters were received, accompanied by specimens, all of which proved to be of the same species. The following extracts from correspondence have been selected to show the extent of the injury, and are given at some length on account of the importance of the outbreak:—

'Kelowna, B.C., July 9.—I send you under separate cover in a tin box a half dozen specimens of a worm that is eating our tobacco crop quite seriously. Please tell me what they are and what I must do to destroy them.'—H. G. Watson.

Mr. Watson was written at once that the caterpillars were the so-called Variegated Cutworm, and the remedies of most use for this class of injurious insects were recommended. Immediately after this began an extensive correspondence with Mr. J. R Anderson, the Deputy Minister of Agriculture for the Province of British Columbia, who was most untiring in his efforts to distribute information as to the habits of this insect and the best means of meeting its attacks. As soon as any new feature was discovered, which it was thought would be of use to the farmers and gardeners of British Columbia, circulars and emergency bulletins were issued and distributed broadcast. I have no hesitation in saying that the prompt and energetic measures which were carried out by Mr. Anderson in this phenomenal outbreak of such a large and injurious caterpillar, with the habits of which farmers and gardeners were wholly unacquainted, was the means of saving thousands, if not hundreds of thousands, of dollars worth of crops. That the outbreak was of an unusual nature was shown by the receipt on July 20 of the following telegram from Mr. Anderson:—

'Victoria, B.C.—Wire advice on receipt my letter seventeenth. Case very urgent.'

The following is the letter referred to:—

'Victoria, B.C., July 17.—By the present opportunity I am sending you specimens of cutworm, an invasion of which has suddenly set in. They are devastating everything they come across. The first report I received from Lulu Island, where Mr. Tom Wilson found them feeding at night. This was quickly followed by reports from

Cowitchan, Chilliwack, and lastly from Saanich, the outbreak therefore is widespread, and is naturally causing great consternation. You will see that they are of various sizes, but I take it they are all the same species, although quite different in appearance. I have sent a letter to *The Colonist*, giving extracts from your reports as to the remedies for cutworms. Let me have further advice as soon as possible.'—J. R. ANDERSON.

'July 21.—I wired you yesterday asking you to advise me by telegraph as to the subject of my letter of the 17th. Since the 17th I have been deluged with reports of the ravages of these cutworms, and I have published further articles relating to their life history, the remedies, &c., taken chiefly from your reports and from Prof. Slingerland's bulletin. I went out yesterday to Mr. Wrigley's place at South Saanich and witnessed the depredations of these pests. It is truly astonishing to see the manner in which whole fields of carrots and other things are cleared off. Mr. Wrigley was spraying vigorously.'—J. R. A.

'July 30.—Your letter of 23rd inst. received this morning. I am printing part of it in an additional leaflet, giving also extracts from a letter from Mr. Brodie, of the Washington Agricultural Experiment Station. These are going to all the newspapers for publication. The infestation by this insect in Washington amounts to a plague, and I fear most root crops will be lost, as well as other green crops. In consequence of the exhaustion of Paris green in the province and adjoining states, the government was appealed to. I therefore wired you this morning to send 500 pounds.'

'July 31.—I inclose you a copy of an additional leaflet I have published. A meeting of the Victoria Farmer's Institute was held last night at the Royal Oak, for the purpose of considering the cutworm question. I attended it, and read your letter. We all wished you could have been there. The experience of those present went to show that those who used the poisoned bran as you directed were very successful in killing off the cutworm, but the numbers of these are so great that it seems almost hopeless. There was, however, after the meeting, a more hopeful spirit among those present, and I think, if we only had Paris green, every one would use it. The lawns in front of the government buildings here are swarming with cutworms. I have induced the caretaker to have them rolled. This is killing them by thousands.'

'August 2.—I was told by a gentleman from Salt Spring Island that he had noticed five cases of the cutworms devouring those which had been poisoned I am also told that some of the worms are being attacked by parasites, but I have not seen anything of this myself as yet.'

'August 6.—Paris green came safely to hand yesterday. I am now distributing it to the different Secretaries of Farmers' Institutes.'

'August 15.—I am much obliged for the specimen of *Peridroma saucia* which you have sent. This moth will be very useful to identify our British Columbian specimens by, when they emerge. None of the chrysalids have given the moths yet here, but Mr. Tom Wilson gave me one a day or two ago when I was in Vancouver, which he had hatched out. It is undoubtedly the same insect. Do you think it at all likely that another brood of caterpillars may hatch out before winter?'

'August 16.—I inclose you a copy of a part of a letter from Mrs. J. S. Place, of Dog Creek, B.C., This is a part of the province which I do not think you are acquainted with. I think you will find the letter of great interest, as it gives the date when the eggs were laid. Mrs. Scott, the wife of the mayor of New Westminster, told me that a short time ago she noticed a number of small loopers where the light happened to fall on a light coloured patch on the carpet in her drawing room. She found that they were dropping from a curtain cord where she found the remains of a cluster of eggs. She had previously destroyed several of these egg-clusters which she had found deposited on the curtains and other places in the room.'

The following is the letter Mr. Anderson refers to:—

'Dog Creek, B.C., August 10.—We had an acre and a half of potatoes, and the cutworms ate all the leaves off in two weeks, leaving only the stalks. When they had finished eating the leaves of the potatoes, they began to cross the fence into the vegetable garden. The fence was just covered with them. However, we cut a ditch through the garden and turned on water. They then tried to cross and were drowned by thousands. Some managed to get over on straws and bits of twigs. We have killed large numbers with Paris green and lime, but we happened to be without any Paris green, and they got a week's start of us. Now I want to ask a few questions. The 28th June was a very hot day, and we had clothes out on the line. When I gathered them in, the clothes had about 50 or 60 separate lots of eggs. I had to get a knife and scrape them off. They were a pale yellow, nearly white. I then went to look at the hops, and found there quite a lot of these egg clusters underneath the leaves. Then we began to look round and found that the same eggs were laid on the windows and all over the verandah. We set to work and got steps and crushed all we could see, which was a very large amount. I thought of sending you some of these leaves, and I am sorry I did not do so. The caterpillars have eaten the potatoes, and now they are thick on the peas and beans. They will eat the end off a pod and then eat the inside. Of onions they eat the top and then go down the stalks. Do you think that the eggs mentioned above are what the cutworms now so troublesome hatch from ?'—MRS. J. S. PLACE.

In reply to this letter, Mr. Anderson answered that he had no doubt that the eggs mentioned were those of the parent of the Variegated Cutworm, and there is no doubt he was accurate in this opinion. Dog Creek is in one of the arid districts of British Columbia, where irrigation is resorted to, and the plan adopted by Mrs. Place in preventing the cutworms from travelling by turning on water is an excellent one which has been resorted to very satisfactorily at Kelowna and Vernon, B.C., during this outbreak.

'Victoria, B.C., September 20.—I have a number of the chrysalids from caterpillars sent to me by Mr. E. A. Carew-Gibson, under date of September 2, from the 150 Mile House, now inclosed in a gauze cage. I will put them out of doors as you suggest, and place some twigs, leaves, &c., for the moths to lay their eggs on when they emerge. Mr. Gibson says in his letter accompanying the caterpillars : "I am sending you by this mail a box containing about 20 pupæ and a handful of larvæ of the year's pest—cutworms. I take it these are the same which are so bad all over the province this year. The amount of damage done and the extent of country covered seems extraordinary. At the mining camp at Horse Fly, an isolated settlement 32 miles from here, cutworms have this year completely destroyed the gardens, and have denuded potato fields of their foliage. They have been equally harmful at Soda Creek and Quesnelle Mouth. We were not able to get hold of the Paris green as quickly as it was needed, and the damage was nearly accomplished before the larvæ were much noticed. These cutworms do not seem at all particular about their diet. The handful I send were picked from under hop vines, nasturtiums and sweet peas, growing against this house." I thought that you would like to get this note of the occurrence at 150 Mile House, because it is so far out of the way.'—J. R. ANDERSON.

'September 21.—Several of the moths from Mr. Gibson's caterpillars have already emerged this morning. This surprised me, as I thought they would be much later.'

To the above quotations from a few of the letters received from Mr. J. R. Anderson, the following extracts from other correspondents, may be added :—

'New Westminster, B.C., July 21.—Cutworms are doing immense damage to all crops on the lower mainland. I have been afraid of this for some time, as I noticed the extraordinary number of common cutworm moths at "sugar". Kindly let me know at once what you advise as the best means of keeping them down. I have found that tobacco sprayed over plants makes them distasteful to the caterpillars. They are everywhere, in fields, in gardens and in greenhouses.'—W. A. DASHWOOD-JONES.

'Vernon, B.C., July 23.—We forward to-day a tin box containing sugar beet and grubs. We first noticed this grub around an old potato pit where we had potatoes for the pigs last fall. They have destroyed about an acre of sugar beet adjoining this pit. We have them also around the house on the clover, and they have stripped the hops from the verandah. We have a few on our hop-yards, but very few. We trust that they will not increase on the hops, as they are too far advanced to spray with Paris green. We are poisoning with Paris green on our sugar beet, and also surrounding the patch with a ditch and water to try and stop them travelling. Are they likely to be worse next year.'—D. C. Ricardo.

'Comox, B.C., July 23.—I send a number of caterpillars. Please let me know all about them, as they are in such numbers here at present as to be a perfect scourge, and threaten to destroy all vegetation. They attack everything green, field crops, garden crops and house plants. They are here in millions, and are as destructive to the potato as the Colorado Beetle, but are equally so to turnips and other crops. They eat every portion of the leaf except the ribs, which they leave bare and dead. I have been all over the district, and find the pest universal. We are spraying with Paris green.'—John J. R. Millar.

'Agassiz, B.C., July 24.—I send five cutworms. These are so plentiful that I picked five on the walk without moving a foot. They are eating the leaves of many of the shrubs, vines, &c., besides garden plants. In the orchard they have attacked the pears. In the field they are eating the fleshy outside covering of the pea pods. The only remedy I can suggest is to sweeten a bran mash and doctor it with Paris green. They are here in swarms. What can we do to protect our crops?'—Thos. A. Sharpe.

'Frock, B.C., July 25.—I wish you could tell me how to get rid of these worms out of my garden and potato fields. The ground is just covered with them. They eat leaves, stems and everything of vegetables, and then take the root very often. They have destroyed everything for me this year, so that I shall have nothing for winter use. Is there anything I can do to prevent these things next year? I never saw anything like them before. In the parcel I send, the small ones are picked from the stems and the big ones from the ground.'—Nils Fralander.

'Victoria, B.C., July 25.—The enormous numbers of cutworms have naturally reduced the food supply and made it necessary for them to change their usual feeding habits. This necessitates a corresponding change in methods of fighting them. I find them distributed all over all kinds of plants, vegetables, flowers, &c., and feeding at all times of the day and night; in roots such as carrots and mangels, they eat holes and live inside these; also in tomatoes; in fact, they are everywhere. Many complaints are coming in now of their injuring fruit trees and fruit, and the loss to the farming community on their account is going to be very large. In many cases people are slow to use Paris green, being afraid of it, or use it too late. I have had excellent results where the pests are distributed promiscuously over the plants by using a Paris green mixture, dusted or blown through the entire leaf surface, one pound of Paris green to twenty pounds of flour, while the bran and arsenic mixture is effective only in certain instances. A Paris green spray is not so generally effective as the powder form, but I think this is due to the fact that many persons spray too heavily and most of the poison is washed off the plants. Reports are coming in now from Saanich that grain crops are suffering and the work of the cutworms seems almost identical with that of the true Army Worm. It is certainly the most serious occurrence of this nature since I have been in office. I shall be glad to know the proper names of the species as soon as you have reared them. I suppose there will be several different kinds.'—R. M. Palmer.

'Victoria, B.C., August 17.—It is quite a relief to know that you consider it unlikely that we shall have another plague of cutworms next year. Such an event would be indeed disastrous. My own investigations have led me to come to the same conclusions as were stated in your recent letter to Mr. Anderson, namely, that so many of the cutworms are parasitized, at any rate in some localities, that there is no reason to anticipate such a plague in 1901, as we have had this season.'—R. M. Palmer.

'Agassiz, B.C., July 27.—There is what is to me a strange feature in this attack, the cutworms are eating a number of my Thuyas. *Thuya vervaeneana* is one that they appear to be particularly fond of. There appears to be a slacking off in the numbers of these cutworms now, but this may be only temporary. However, many are going into chrysalis just under the suface of the ground. Would it be well to plough clover fields with a shallow furrow and plough or disc with a spading harrow all other fields? Would this have any effect in lessening the caterpillars or killing the chrysalids? I dislike the idea of ploughing up my clover, but would not hesitate if it would be useful. I am told that some hop yards will not pick a hop. Mr. Breed, in Saanich, is one who has no crop this year, on account of the cutworms, and they have begun on the yards here. I saw a field of four acres of potatoes this morning, and I think there is not a hatful of foliage left in the field. Ours, so far, are saved, but how long this will continue I do not know. I sprayed roots, potatoes and trees, until all my poison was gone, and now I would use poisoned bait if I could get the poison, but cannot before Monday or Tuesday.'—Thos. A. Sharpe.

'Maywood, Victoria, B.C., July 28.—I send specimens of a cutworm which is devastating the gardens and fields round Victoria. Whole crops of roots are entirely eaten up, and the corn is now being attacked. It is the most serious disaster I have seen in the eleven years I have lived here. Round five turnips in my garden I found 236 cutworms. Many farmers have lost their entire crops of carrots, potatoes and other roots. A row of sweet peas, sprayed with double-strength Paris green, was again covered 12 hours later. Nothing escapes. Carnations have every flower bud eaten out. Dahlias are eaten to the stems. We shall soon have nothing left. They have attacked the flowers in the conservatories and the tomato houses, where I have poisoned them with bran and Paris green.'—J. W. Webb.

'Victoria, B.C., July 30.—Yesterday I drove out about five miles and saw several gardens. I assure you it was a sorry sight. In some places even rhubarb was entirely stripped, only the stalks and leaf ribs being left. Potatoes were stripped to bare stalks, and the worms were eating the tubers. Some tubers had four or five cutworms in them. These latter are so abundant that they are crawling about in search of food by day.'—Geo. A. Knight.

'Langley Prairie, B.C., July 30.—The worms are destroying potatoes and root crops. Yesterday was the first day I noticed them. They have been very bad at Chilliwack.'—D. H. Nelson.

'Kaslo, B.C., July 31.—We have been suffering all through the Kootenays for several weeks past with a plague of grubs, not the ordinary cutworm, but a dark grub which has attacked all vegetables and almost all flowers. I am now trying whale-oil soap and quassia. The latter I have found the best thing for roses, but from all I can see these remedies will have no effect against this grub.'—Geo. Alexander.

'Armstrong, B.C., August 1.—The cutworms are much larger than our ordinary cutworm, and have been much later in appearing. They are doing an immense amount of damage nearly all over the province, some potato fields being about destroyed. Some people assert that it is the Army Worm.'—Donald Graham.

'Victoria, B.C., August 3.—I have one moth hatched out and many chrysalids, so I hope the worst is over for this season. Still there are many small larvæ yet.'—R. M. Palmer.

'Agassiz, B.C., August 6.—I am sending cutworms of very different sizes. I found them and the chrysalids in the same bed of garden peas. There were so many chrysalids that I was in hopes the trouble was nearly over, but, if the smaller ones have to grow as large as the big ones, it must be some time yet before they pass away.'—Wm. S. Jemmett.

'Agassiz, B.C., August 11.—The cutworm nuisance seems to be abating at last.'—Thos. A. Sharpe.

'Nanaimo, B.C., August 13.—I send you a few notes on *Peridroma saucia.* The moth was very common round my house in June, and I captured several. I do not remember to have taken it in British Columbia before. The first caterpillars I saw were in a field of potatoes at Boat Harbour, on July 15. I did not recognize the caterpillar. It is not one of our common British Columbian cutworms. Since July 15, of course, everybody has heard of it, and the damage done has been very considerable. Mangels, potatoes, turnips, &c., have been bored into, wherever near the surface of the ground. The caterpillars have travelled a little when food was scarce, and they have stripped nettles, thistles and bracken just outside fences. They have also attacked the second growth of clover, and have climbed fruit trees when planted near garden stuff. The larvæ are now pupating, and some moths have already appeared. This, I think, establishes the fact of a double brood. I collected at willows, and presume I should have taken some of the moths, had they hibernated as such.'—Rev. G. W. Taylor.

'Nanaimo, B.C., August 25.—*P. saucia* is now coming out of pupa state in considerable numbers. I have no doubt about two broods now, and I fear an attack of caterpillars must be expected in spring.'—G. W. T.

'Kaslo, B.C., August 16.—I made a tour through some ground which I knew had been infested with cutworms, but found that they had all pupated, so I mailed you last night a box of pupæ. These were so thick in the ground that every spade would turn up from three to nine pupæ. These caterpillars when young were blackish-gray on the back and lightish stone colour on the legs and belly, with a row of four yellowish spots on the back. After the last moult the general colour is greenish stone, and the four spots fade considerably, in some specimens they are almost imperceptible. They vary much in colour and size. If I am correct in my supposition of the moth of these pests, it has not appeared here before in any numbers. I had none of the moths prior to last spring. The last visitation of cutworms was in 1892.'—J. W. Cockle.

'Armstrong, B.C., August 18.—I notice the chrysalids from the cutworms in constantly increasing numbers among my potatoes.'—Donald Graham.

'Agassiz, B.C., August 18.—The cutworms are gone, but the potatoes, mangels and peas have been seriously injured. In some cases, as the mangels, our crop is destroyed. The peas were lessened 50 per cent, and potatoes are defoliated to a considerable degree, but the absolute injury will not be known until they are harvested.'—Thos. A. Sharpe.

'Chilliwack, B.C., September 3.—Cutworms have been devastating our pea crop and roots. However, I have only lost about 15 acres of peas, so I consider myself lucky; but some of those I have got harvested are shrivelled and very small.'—G. Maxwell Stuart.

'Okanagan Mission, B.C., August 20.—Caterpillars did a great deal of damage here this year, but copious irrigation proved a pretty good method of controlling them.'—J. T. Davies.

In summing up the insect injuries of the year in British Columbia, Mr. R. M. Palmer writes, as follows :—

'Amongst insect pests occurring during the year the Variegated Cutworm has made a record of damage far exceeding anything known in the province. You have so much data from Mr. Anderson on this that it is unnecessary for me to deal with the matter at length. The crops which suffered most severely were potatoes, tomatoes, cabbage and allied plants, peas and clover. The cutworm seriously injured the apple crop in some districts, and also defoliated or cut off many young shoots of fruit trees. To prevent the cutworms from climbing the stems of fruit trees, banding them with a strip of the common sticky fly paper proved very effective, and when the Paris green and bran mixture was deposited near the base of the trees, immense numbers of the pests were destroyed. A capital plan in using the poisoned bran for this purpose, is to cover the mixture with pieces of sacking or other material, under which the cutworms collect, and feed—while poultry and other birds are prevented from getting the poisoned bran—a very important matter.

'There is no doubt that much of the loss caused by the cutworms could have been prevented by timely use of Paris green, but the plague was so unexpected, much valuable time was lost before farmers generally woke up to what was going on, and when the fight was fairly started, unfortunately the supply of Paris green was not equal to the demand.

'The wide circulation given by Mr. Anderson to your letters containing information as to ways and means of fighting the cutworms was much appreciated, and the methods advised were adopted generally.'

The following epitome of this remarkable occurrence of a common native species was written by Mr. Anderson at the end of the season, and will be read with interest :

'Victoria, December 3.—Regarding the cutworm outbreak which occurred in this province last summer it might appropriately be characterized, on account of its suddenness, extent and the myriads of individuals, as a veritable plague. I have not been able to ascertain how far south and east the plague extended, but it may safely be said that the States of Oregon, Washington and Idaho, and the whole of the province of British Columbia, as far north as any reports were obtainable from, were infested. The first report to this department was made by Mr. Tom Wilson, in the middle of July, he stated that the potato tops on Lulu Island were being devoured by some insect, but which, in spite of diligent search, could not be detected. Suspecting the cause, I advised looking for the culprit at night with lanterns, this was done with the expected result. Not suspecting the infestation to be widespread, I merely recommended the treatment usually followed. However, a few days later reports began pouring in from all parts of the province and bulletins were issued from time to time recommending the remedies you prescribed in your reports. The sweetened bran poisoned with Paris green, when it was used in accordance with directions, was found to be most effectual.

'Unfortunately, the supply of Paris green, not only in this province but in the adjoining states and California, was not equal to the demands, in consequence of which great havoc was wrought before a supply could be received from the East. When at length a supply was obtained, many of the caterpillars had passed into the chrysalis stage. The numbers of the caterpillars were simply incredible ; in places the surface of the ground was described as a moving mass, and where they were poisoned in any numbers the stench was unendurable. On account of their numbers and the consequent scarcity of food, they soon relinquished their natural nocturnal and non-climbing habits, and myriads could be seen crossing the dusty roads in the heat of the day in search of food ; fruit trees, if not protected, were ascended, and the fruit as well as the leaves consumed. Naturally, green succulent food was first consumed, but, as that got scarce, anything and everything was attacked ; after consuming the tops of potatoes, turnips, onions, carrots and such things, the tubers were attacked. Potatoes which were well matured and those which were quite late, escaped with the least loss ; carrots and onions suffered very severely. The potato crop was probably reduced one-third, and other root-crops in proportion. The second crop of clover was almost entirely destroyed. Grain was attacked, but no material loss resulted.

'In August the caterpillars began to enter the chrysalis stage, and their ravages began then to be, of course, much lessened. Altogether, the period of activity lasted about from six weeks to two months. A number of caterpillars which I had in captivity were all in chrysalis by the end of August or the beginning of September. A number of these emerged as moths in October, but I have not been able to discover any eggs. A large number of the moths were also caught in the grass-cutters used on the lawns surrounding the government buildings here. My observations have led me to the following conclusions, viz.: That the cutworms appeared in such abnormal numbers owing to the scarcity or absence of their natural enemies, parasites, birds, &c.; that where fowls were allowed to roam the plague was reduced to a minimum ;

that poisoned bran when used as directed is most efficacious; that parasites are increasing and will probably reduce the numbers of cutworms next season ; that from good services rendered in devouring great numbers of these cutworms the crow frequently so destructive to potatoes and other crops in this province, has this year done the farmers good service.'—J. R. ANDERSON.

* Fig. 12.—Variegated Cutworm: moth—twice natural size.

DESCRIPTION OF THE INSECT.

The moth, which is the parent of the Variegated Cutworm, is a large species expanding from an inch and a half to nearly two inches when the wings are spread. It varies very much in colour ; the forewings are, as a rule, rather dark brown, but varying to ochreous or russet-brown, shaded on the disk and toward the end of the wing with darker brown ; occasionally specimens are quite light along the costal region and at the base of the wing. The wings are crossed by the usual four more or less distinct double wavy bands, but in many specimens these merely show as double spots on the costa. The reniform or kidney-shaped spot is usually darker than the orbicular or round spot, and the reniform bears a few white scales on the outer margin. In two specimens no trace of the reniform or of the orbicular can be seen. The underwings are pearly-white in the centre, with a purplish sheen, bordered broadly and veined with dusky brown, and fringed with white (hence the English name of this moth, The Pearly Underwing). The thorax is of the same colour as the forewings, and bears in the centre a tuft of raised light-tipped scales.

The eggs are laid in elongated flat patches, and were first found by Dr. Riley and figured in his First Missouri Report for 1868. In years of great abundance it is probable that these eggs are laid in various places other than on the food plant. Eggs which were most probably of this species were found upon curtains, on clothes hanging on lines, and on the woodwork of houses, by Mrs. Walton, of Armstrong, B.C., and Mrs. Place, of Dog Creek, B.C. On hatching, the young caterpillars, as is the case with some other cutworms, are loopers, and resemble the larvæ of the Geometrid moths, lacking some of the prolegs which appear in later stages. A full account of the appearance of the larva in the different stages is given by Dr. Lintner in his Fifth Report as State Entomologist of New York.

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* Figures Nos. 9 and 11 have been kindly lent by Prof. Otto Lugger, and Nos. 10, 12, 13 and 14 by Prof. M. V. Slingerland.

Fig. 13.—Variegated Cutworm : eggs.

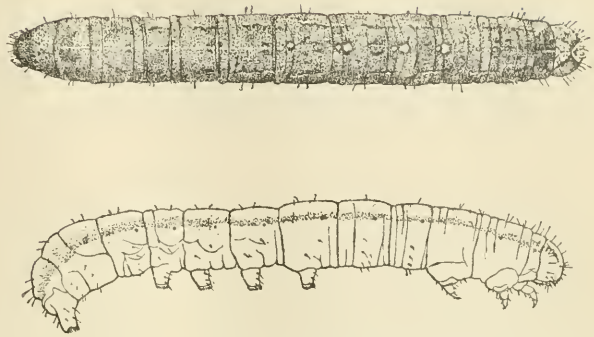


Fig. 14.—Variegated Cutworm—enlarged one-half.

The following is a description of the full-grown larva, the form in which it appeared as such a destructive enemy among the crops of British Columbian farmers and gardeners last season :—

Heavy-bodied cutworms, about two inches in length by over a quarter of an inch in width, of varying shades of gray or stone colour, the whole body finely mottled and variegated with black, gray, brown, or pinkish markings, any one of which may predominate more or less in different specimens ; many have a ruddy appearance from the ground colour of the skin being of a pinkish colour. The markings of these caterpillars consist of a conspicuous yellow band, mottled with orange, beneath the spiracles; a sub-dorsal interrupted stripe of velvety black blotches washed with orange, sometimes very conspicuous, but at others almost obliterated ; a medio-dorsal line of yellow, almost continuous from the head to the apex of the anal flap. This line expands into four or sometimes five conspicuous yellow spots, situated in the centre of the middle segments. These spots are always present on segments 4 to 7, those on 5 and 6 being the largest. There is also occasionally a spot on segment 3. The supra-stigmatal area bears on each segment, except the head, a diagonal blackish, curved, almost S-shaped mark, the lower end of each of which incloses the black spiracle. These marks form a wide, but on some specimens distinct, sinuous band between the sub-dorsal stripe and sub-stigmatal band. On segment 12, the sub-dorsal stripes meet and form a black velvety patch, somewhat like the letter W, with the lower part filled in. Behind this, on segment 13, and the posterior third of segment 12, is an orange or pale patch, sharply defined anteriorly against the straight edge of the velvety patch on segment 12. The ventral surface is paler than the dorsal and glaucescent. Head round, deeply cleft at summit, testaceous, coarsely mottled with brown or reddish markings. In the centre of the face are two curved black stripes which, starting from the summit of each lobe of the head and converging, meet above the frontal triangle, and then run down to the base of the antennæ. Thoracic feet testaceous ; prolegs concolorous, bearing testaceous chitinous plates at the base exteriorly ; claws blackish.

When full-grown, these caterpillars burrow a short distance into the ground and form a smooth oval cell, in which they change into the chrysalis or pupal stage, when they are of a bright chestnut brown, about three-quarters of an inch in length. The anterior segments following the rounded head parts and to the tips of the wing covers, are cylindrical, but the six remaining segments, as has been noticed by several correspondents, are capable of movement. These segments diminish in size to the tip, which is armed with two slender black spines, which lie so close together as to appear as one, unless closely examined with a magnifying glass. This stage for the second brood, of which the moths emerged in August and September, was from 20 to 23 days.

There is no doubt that there are two broods of this moth in Canada, as was stated to be the case by Dr. Riley, in Missouri, many years ago. The moths of these two broods appear normally about the end of June and after the middle of August ; but it seems as if some individuals of this latter brood may be delayed in emergence till late autumn, or even till the following spring. Prof. Otto Lugger writes that he has taken this moth so frequently at St. Anthony Park, Minn., very early in the spring, from March 2 to 27, that he feels almost certain that at least some of the moths may hibernate as such. He has also found them very late in autumn, after all foliage had disappeared from plants. In fact, he finds such irregularity in the appearance of this species, that they can be obtained almost throughout the season. On November 9 last, I dug up at Ottawa two pupæ which produced the moth ten days afterwards indoors. This was nine days later than the date when the ground was covered with a fall of snow, which has remained ever since, and will in all probability be here until next spring. Therefore, had these pupæ not been found, the moths could not have emerged from them until next year, showing that the species sometimes hibernates as a pupa ; but a large number of the moths, by far the largest of those reared this year, appeared by the third week in August, and it seems probable that with this species, as with a great many other cutworms, egg-laying would take place by the end of August and the beginning of September, that the young larvæ would hatch and make part of their growth before winter, or even, as in the case of *Carneades ochrogaster*, Gn., that the eggs might remain unhatched until the following spring ; it would thus appear, from the very diverse dates at which the perfect moths and caterpillars have been found, that this species may pass the winter in almost any stage, and this is doubtless the case with a great many other species, the life histories of which have not been perfectly worked out. An excellent article on the Variegated Cutworm has been published by Prof. Slingerland (Bull. 104, Cornell Agric. Exp. Stn., 1895.)

The most important facts with regard to the insect are the class of crops which are likely to be injured by it, and the best remedies with which to prevent its injuries. As to the range of its food plants, the extracts given above indicate pretty well that almost any vegetation is acceptable.

Professor French, in the Seventh Report of the State Entomologist of Illinois, says: 'The Variegated Cutworm is widely distributed, and it is probable that we have no other species that is more voracious or is a more general feeder. While some kinds of cutworms are not found much out of certain situations, this may be sought in any place during its season with a good prospect of finding it. There seems to be no cultivated crop that is free from its attacks, and when these are not at hand, it readily preys upon weeds that are found in fields and by the roadsides.'

Remedies.—The remedies for cutworms have been given so frequently in former reports that it is hardly necessary to repeat them in full here. Briefly, they consist of:

(1). The banding of freshly set-out annual plants with rings of paper or tin.

(2). The poisoning of the caterpillars either with traps of fresh vegetation tied in bundles and, after being dipped is a mixture of Paris green and water, or other poison, distributed at short intervals over infested land, when the cutworms appear. A modification of this remedy which has given the greatest satisfaction in British Columbia during the past season, is known as the poisoned bran remedy. This was first used successfully on a large scale some years ago in California as a remedy against grasshoppers in vineyards, since which time it has come more and more into use, owing to its efficacy and the ease with which it can be prepared and applied. This mixture consists merely of bran, moistened with sweetened water, and Paris green, mixed in the proportion of 1 pound to 50 pounds of bran. In making this mixture, the most convenient method is to dampen a small quantity, with the sweetened water, a few ounces of sugar in a pail of water, and then add more dry bran until the whole is almost dry again. If the Paris green is added to the bran without dampening it, it sinks with remarkable rapidity to the bottom, even in this dry mixture, when it is stirred. If it is desired to use the poison as a wet application, more water can be added until it is of about the same consistency as porridge ; but if to be used dry, dry bran must be stirred in until the mixture will run through the fingers easily. This poison may then be applied to the land, either around or between plants to be protected, or a row of it may be run close to the drills of crops planted in that manner.

PARASITES.

The valuable aid rendered by parasites, whenever any injurious insect appears in unusual numbers, is so well known that the practical entomologist is always on the alert to detect if these are present during an outbreak of an injurious species, such as occurred in the case of the Variegated Cutworm in British Columbia during the summer of 1900. That these were present in some numbers was proved, but they seem to have been local in their distribution. They are, however, difficult to detect, and it is to be hoped that they may have been overlooked in many instances. At Nanaimo they were looked for carefully but unsuccessfully by the Rev. G. W. Taylor, an experienced entomologist, and he is of the opinion that there may be trouble again in that locality next year. The experience of the past with regard to similar outbreaks would, however, seem to justify a more hopeful view of the case. Cutworms of all kinds have many enemies, both parasitic and predaceous, and these increase with remarkable rapidity, so that two successive years marked by such an outbreak as was experienced this year would be almost without precedent. Not only will parasitic and predaceous insect enemies, and fungous and bacterial diseases have increased, owing to the large food supply, but many insectivorous birds and domestic animals, having learned how to find them, will be ready to assail them next year on their first appearance. The phenomenal abundance of the Cutworms and the widespread injury they wrought has forced farmers and gardeners to learn their habits and acquaint themselves with the most practical remedies. The following are a few extracts from correspondence bearing on the subject of the natural enemies of the Variegated Cutworm in British Columbia.

'Nanaimo, August 13.—I have boxed up a couple of hundred caterpillars of *saucia* for the sake of breeding parasites ; but they seem remarkably healthy, and I have not seen a single one attacked by Tachina Flies.'—Rev. G. W. Taylor.

'Victoria, August 17.—I send larvæ of what I take to be a parasite. The man who brought them to me said he put cutworms only into a jar, and on looking at them a few days ago, he found one dead one, killed, I think, by parasites, two chrysalids and these larvæ in an earthen hollow which had, I think, been inhabited by the host.' —J. R. Anderson.

'Victoria, August 3.—You will be pleased to learn that some of the caterpillars are parasitized by ichneumon flies, and it is reported to me from Salt Spring Island that "white eggs" (Tachina eggs ?) are on many of the cutworms near their heads.'— R. M. Palmer.

'Victoria, August 17.—Three lots of larvæ which I had under observation, were almost all destroyed by the maggots of a parasitic fly, no doubt the same species as you found in your Victoria consignment of larvæ. Field investigations show the parasites to be well distributed.'—R. M. Palmer.

'Vancouver, August 20.—I saw in a recent letter in the papers (with reference to cutworms) that you state that cutworms turn to moths. In going over a farm near here, I picked up a number of chrysalids, among others one that was just bursting, in fact the insect was partly out ; it was not, however, a moth, but a large black fly, and seemed to pretty well fill the chrysalis. The fly was not unlike a black flying ant, but with very long legs, in fact a sort of cross between a flying ant and a hornet. It had a small sting apparently. Is this a parasite of the cutworm ? I have frequently seen these flies in the gardens and on the farms. There are a great many about just now.'—C. E. Hope.

This last important observation evidently refers to an Ichneumonid parasite. The larvæ sent by Mr. Anderson produced *Meteorus vulgaris*, Cress., a well-known parasite of all kinds of cutworms, and the flies mentioned by Mr. Palmer, as reared at Ottawa, from caterpillars sent from British Columbia, were the large muscid the Cattle Fly (*Muscina stabulans*, Fallen), of which no less than 17 were reared from one sending of caterpillars from Victoria.

'Nanaimo, August 27.—*P. saucia* is now coming out of the pupa state in considerable numbers. So far as I can see in this district, the parasites have not done very much for us. I have only seen one caterpillar attacked by hymenopterous parasites, and only a very few by diptera. Many caterpillars, however, have shrivelled up in the pupal cell without changing.'—Rev. G. W. Taylor.

Several correspondents mentioned finding the caterpillars dead on the ground, or in the cavity made in the ground by the cutworms, before turning to pupæ (or chrysalids). Some of these were sent by Rev. G. W. Taylor, who had found them in considerable numbers at Nanaimo. These were forwarded to Dr. Roland Thaxter, at Harvard University, in the hope that a parasitic fungous disease might have been discovered, but unfortunately no fungus could be detected. Dr. Thaxter writes: "I looked at the *saucia* larvæ soon after receipt, but found no sign of fungus. It is possible that it may have been bacteriosis, but it would be impossible to determine this from the material. Such cutworms are subject to *Empusa aulicae*, and I have no doubt that if careful investigation were made during one of these invasions, this or some other *Empusa* would be found destroying them.'

PREDACEOUS ENEMIES.

Wild birds were occasionally spoken of as destroying these caterpillars, but as a rule the kinds were not specified. Robins are mentioned by Mr. Dashwood-Jones, and the following letter is from Mr. J. R. Anderson :—

'Victoria, August 15.—'I am sure you will be pleased to hear a good word spoken in favour of the execrated old Crow. For some time before it was discovered that the cutworm plague was upon us, I noticed first one, then several, and then a large number of crows busily engaged among the grass on the lawns in front of the Government buildings. On investigation I discovered that they were after the cutworms, and good work they must have done judging from the assiduity with which they pursued their labours. I have since had similar reports from several parts of the province, and even the still more execrated Blue Jay has come in for a good word from some quarters. The old adage is borne out that a certain gentleman is not always as black as he is painted.'

Chickens and ducks are mentioned by several observers as having done good work. The following are among the most interesting records :—

'Victoria, July 30.—I saw a remarkable thing yesterday. There were two gardens close together with the same kind of soil, &c. One was beautiful, the other was eaten bare by cutworms. Chickens had the free run of the first, in the other there had been no chickens. In small gardens there would have been very little trouble in keeping them clean.'—G. A. Knight.

'Victoria, July 28.—I turned the chickens into the garden, giving them water, but no wheat, and they are working at the caterpillars all day, but cannot get rid of them all ; they are in thousands, every handful of soil is full of them. Ducks seem to eat even more than the chickens, but want some one with a rake to bring the worms to the surface.'—J. W. Webb.

Pigs were very useful at Agassiz.

'August 6.—I intended to put down some poisoned bran, but I found nine of my young pigs in the potato field, travelling regularly up the furrows, just moving the earth sufficiently to get at the worms. In no case did I find the potatoes uncovered or touched ; from the look of it, the pigs must have been at this work for some days. They are about 5 or 6 weeks' old, and seem to have lived mostly on these worms. They have eaten nothing in the sty, except from the mother, until the last 2 or 3 days, and they are perfectly fat. I knew they ate a lot of raspberries, but could not see how they got so fat on them. The potato field joins the pig field, and it is my intention to turn the pigs in as soon as I have lifted the potatoes.'—WILLIAM S. JEMMETT.

As there is a possibility that the Variegated Cutworm may again appear in British Columbia next season, it will be wise for every one to be keenly on the lookout for its first appearance in any form, and to write and send specimens promptly to the provincial Department of Agriculture in Victoria, or to this Division, so that advice may be given as to the best steps to take under the circumstances to prevent loss. Observations on the occurrence of parasites, and predaceous insects, and of work done by wild birds, poultry, pigs, &c., will be of special interest, and I shall be greatly indebted to any observers who will report to me any instances which may come under their notice.

THE SPOTTED CUTWORM

(*Noctua c-nigrum*, Linn.).

Among the outbreaks of cutworms reported to this Division during the season of 1900, mention may be made of one which occurred in Ontario just at the same time that the Variegated Cutworm was doing so much damage on the Pacific coast. Injury was reported from Niagara and several places north of Lake Ontario. The moth was also extremely abundant at Ottawa from July to the end of the summer. Almost all kinds of vegetation, with the exception of the various grasses, were attacked, and the larval habits of this species seem to resemble very closely those of the Variegated Cutworm. Young larvæ in the looper stage were received from Niagara, from Mr. Joseph Healey, on June 13, who had found the cluster of eggs upon an apple tree and the larvæ were reared to maturity upon the leaves of that tree. Pupation continued from July 24 to 27, and the moths all appeared from August 18 to August 25. The following extracts refer to two of the worst occurrences reported :

'Whitby, July 25.—Upon examining some tomatoes to-day, the fruit of which is not more than half grown, I discovered that, with scarcely an exception, the tomatoes were more or less eaten by greenish coloured grubs, the largest of which were a little over an inch long, some being quite small. They ate through the skin and then consumed the inside. There were a number, a dozen or so, in each tomato. The plants are healthy and vigorous, the foliage not being affected. There are thirty or forty plants in the patch. Every one I examined was in the same condition. The grubs are not very active. As the matter may be of economical importance, I thought it would be well to let you know about it at once. It may, of course, be only a casual invasion ; but, should it spread and become general to the extent that this patch of mine is affected, it will prove a serious matter for tomato growers.

'Since writing the above I have learned from my man that there were a large number of these same grubs in a patch of oats and peas growing alongside of the tomatoes, and that on a nearby farm there were immense numbers in a field of peas. Some cauliflowers growing near my tomato plants are also being visited.'—W. O. EASTWOOD.

'July 30.—As requested I send you some of the grubs from my tomatoes. My man tells me that, upon pulling up some of the affected plants, he found bunches of the grubs an inch or more below the surface, also that they are thick in a field of peas about half a mile from here.'—W. O. E.

'Pefferlaw (York Co.), Ont., July 30.—I send you by mail a box of worms which are abundant on the farm of Mr. James Cornwall, of Georgina township. They have stripped a field of carrots and mangels. They devour the leaves of Canada Thistle, gooseberries, choke-cherries, &c. A field of oats beside the carrots is untouched. About eighty rods away, on the farm of Mr. W. Jackson, they have devoured a field of peas. After eating the leaves of the mangels they attacked the roots and ate large holes in them. They can be dug out of the ground around the carrots and mangels in large numbers. Kindly tell me what they are and advise a remedy.'—THOMAS CORNER.

Like the Variegated Cutworm this is a double-brooded species and is never a rare insect ; but this year it was exceptionally abundant. It was the second brood, the larvæ of which are found in July, which was so destructive this year.

The following is a description of the full-grown larva of *Noctua c-nigrum*, the Spotted Cutworm.

Length, about one and three-quarters inches, by slightly less than a quarter of an inch in width. The markings of this caterpillar are in a general way very similar to those of *Peridroma saucia*, except that the mottlings are finer and less distinct, thus by contrast making the bands and stripes more prominent. The medio-dorsal line is continuous and not expanded into the yellow spots so characteristic of the Variegated Cutworm. The black velvety blotches of the sub-dorsal stripe are more clearly defined, and the posterior extremities do not meet on segment 12 in the black W-shaped blotch of *P. saucia*. The black blotches of this line are all separate and decrease in size anteriorly, and each one bears in front of it, lying towards the centre of the dorsum, a pale blotch, behind which in the centre of each segment is a smoky shield-shaped blotch. These markings give a much more checkered appearance to this caterpillar than is the case with the Variegated Cutworm. The sinuous band between the infra-stigmatal band and sub-dorsal stripe is also shadowed above with pale blotches. The ventral surface is conspicuously paler than the dorsal. This caterpillar as compared with the Variegated Cutworm is more slender, shorter, and the colour is, as a rule, ruddier, the mottlings much finer and the black marking more contrasted with the ground colour.

These caterpillars when full-grown burrow into the ground and form a cell in the same way as the Variegated Cutworm. The length of time from the hatching of the eggs until the caterpillar is full-grown is about six weeks in summer. The hibernating larvæ begin feeding in April and produce moths by the end of May or early in June. It has been noticed, however, by Dr. Forbes, in Illinois (Ill. Agr. Exp. Stn. Bull. 60) that a few are said to continue much longer in the pupal stage, even as late as August. This retardation of development is a common feature with many insects, of all orders, and is doubtless a provision of nature as a means towards the preservation of species.

The moth of the Spotted Cutworm, which, from the markings on the forewings, has been called the Black C Rustic, is a rather showy moth of about an inch and a half in expanse of wings. The forewings are, as a rule, purplish brown, sometimes almost black, in the females, and much paler in the males. There is a black C-like spot in the middle of the forewing, the open part towards the front edge of the wing, and filled with a much paler blotch, which extends beyond the C-like spot and merges with the general colour of the wing. There is great variation, however, in the shade and intensity of the colouring, specimens of both sexes being lighter or darker than the average. The hindwings are dusky, paler towards the base, and of a satiny lustre. The thorax is of the same colour as the forewings, with a distinct pale collar.

The remedies which are recommended for the Variegated Cutworm on a previous page will be found applicable to this species also.

There were but few parasites noticed among the caterpillars sent with the above letters, but upon one larva three curious egg-like bodies were observed, which proved to be the larvæ of a small hymenopterous parasite, which has been identified by Mr. W. H. Ashmead, of Washington, as *Euplectrus frontalis*, How. These parasitic larvæ were oval, like minute white eggs, at first, but later were attenuated posteriorly and about one-twelfth of an inch in length. They were attached to the back of the caterpillar, close to the head, and only relaxed their hold when full-grown, to spin their light silky cocoons among the leaves close to the dead body of the caterpillar, which they had destroyed.

THE CABBAGE PLUSIA
(Plusia brassicae, Riley).

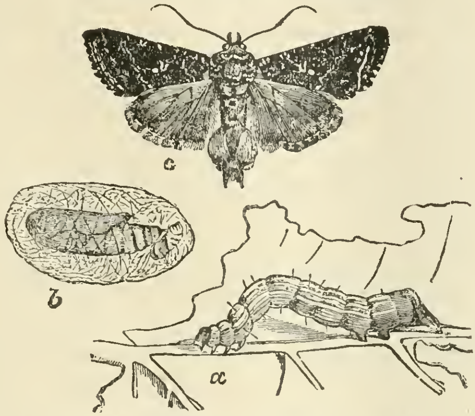


Fig. 15.—The Cabbage Plusia : *a*, caterpillar ; *b*, cocoon ; *c*, moth.
(Cut kindly lent by Dr. S. H. Forbes.)

This insect is frequently a serious enemy to the market gardener in the United States; but I have never received a complaint concerning its work in Canada until the present year. This has been a matter of some surprise to me, because it has been the cause of much loss in States of the Union close to our boundaries, both in the East and in Minnesota. In July last, specimens of the caterpillars were sent in from the North-west, and moths were taken at Ottawa and St. John, N.B., for the first time.

'Regina, Assa., July 18.—The caterpillars I send have been doing some damage in gardens here. I observed them first on potatoes about three weeks ago ; they ate small round holes in the leaves. They have since turned their attention to lettuce. In my own garden they ate a row of green lettuce right to the ground before I found out what was the matter. They have since got into the bronze variety ; but do not appear to devour it so voraciously as the other. I have found them in a neighbour's garden eating the leaves of celery much in the way they attack potatoes. The colour of the caterpillar is a bright, rather blue, shade of pea-green, somewhat whitish along the back. It is very lively, especially when small, and when disturbed rolls itself into a ball. Some of the caterpillars are now spinning their cocoons in the lettuce leaves. Please let me know what species it is, and what remedy to apply.'—J. R. C. Honeyman.

The Cabbage Plusia, also known as the Cabbage Moth, and, in the caterpillar form, as the Cabbage Looper, is said to be, where it occurs, the worst pest known on lettuces grown in forcing houses. It would appear as though this insect were becoming year by year a worse pest, and that the area where it occurs as an injurious insect is enlarging. It may be that before long we may, in Canada, have to reckon with this insect as a regularly recurring enemy.

The most practical means of preventing the work of the caterpillars on lettuces in forcing houses is stated to be the keeping of the ventilators closed with mosquito netting. It is thought that the eggs are sometimes laid on plants before they are taken into the houses, but probably the moths gain access to forcing houses more generally through the ventilators. There are many other plants in greenhouses which are attacked by this caterpillar. In the autumn they have been found troublesome among chrysanthemums, cutting off the flower buds. Smilax and other plants have also been injured. In the open ground the caterpillars are most destructive to cabbages and related plants, such as have smooth leaf surface. They feed on the surface of the leaves, and are said by Mr. Sirrine to be much more particular about what they eat than is the case with the imported Cabbage Worm. They walk rapidly, and, if they find any foreign substance on the leaves, they move off to other parts of the plant.

The caterpillars are pale green, striped with longitudinal whitish lines. The body of these caterpillars is shaped differently from most of the common noctuid caterpillars found in gardens, in that it increases gradually from the head to the last segment, where it is largest and slopes off abruptly. Another noticeable difference between the caterpillars of the Plusias and other noctuid caterpillars, is the fact that they have only two pairs of prolegs instead of four. There are several species of these insects, but none have ever proved very troublesome in Canada. In 1884, the Cabbage Plusia was very destructive in the State of Minnesota, almost equalling the injuries of the common Cabbage Worm *(Pieris rapae,* L.). Dr. Forbes states (Ill. Agr. Exp. Stn. Bull. 60) that the larva feeds on celery, kale, turnip, tomato, lettuce, mignonette, dandelion, dock, clover, lamb's quarters, and some less common cultivated crops. It ranges through the United States and occurs also in Canada. The eggs are laid upon the food plants, singly or in small clusters The larva spins a gauzy cocoon among the leaves. The pupa is light yellowish brown in colour. The moths are very dark, the upper wings being almost black or very dark gray, marked with small white points and indistinct bands, and having a silvery U-shaped spot on the middle of the forewing, and a smaller round silvery dot close to it on the outside. There seem to be two broods of this insect in Canada.

It has proved to be a difficult matter to destroy the caterpillars of the Cabbage Plusia upon cabbage and lettuce crops. Mr. F. A. Stirrine (N.Y. Agr. Exp. Stn., Bull. 144) tried many experiments with remedies, and found that a soap wash containing arsenical poisons proved the most useful. He speaks of this as a resin-lime mixture and gives the best formula for its preparation. The estimated cost for preparing and applying this remedy is $2 an acre.

THE SAN JOSE SCALE

(*Aspidiotus perniciosus*, Comsk.).

This insect continues to receive the keenest attention from practical entomologists in all parts of North America, and most careful experiments have been carried out in the endeavour to find any treatment which will control the scale without injuring the tree. At the present time crude petroleum and whale-oil soaps (caustic potash fish-oil soaps) seem to give the greatest promise in this direction. With regard to crude petroleum, more experience seems to be necessary before a definite recommendation can be made as to the strength and manner in which it can be safely applied. Mr. George E. Fisher, the chief Inspector for San José Scale for the province of Ontario, has experimented extensively during the past summer with both of the above-mentioned materials, and the results of this work, which he presented in an important address before the Entomological Society of Ontario, at the annual meeting in November last, may be summarized as follows :—

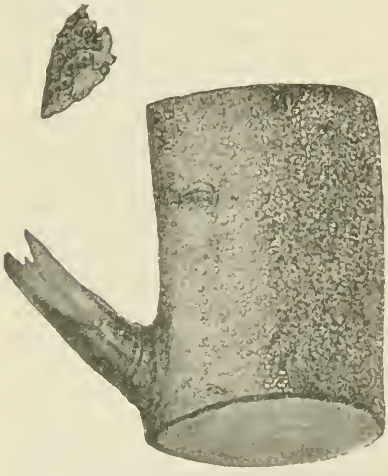


Fig. 16.—San José Scale; apple branch with scales ; large scales above at left.

Whale-oil soap, at a strength of two pounds to one gallon of warm water, killed many scales; but in no case was complete success obtained, however carefully the work might have been done. The trees, nevertheless, were in most cases benefited by the application. The scale was reduced to the greatest degree on cherry trees, and aphids were quite destroyed. Even when trees were in blossom, no injury from the soap was noticed. The treating of trees with the whale-oil soap did not prevent the young scales from settling soon afterwards on the parts treated.

Crude petroleum gave better results as far as the scale was concerned. A mechanical mixture of water with 30 per cent crude petroleum could be used quite safely on apple trees, and also with care upon plum and peach trees ; even this, however, was not a perfect remedy, as all the trees treated had some scale upon them at the end of the season. Mr. Fisher considered that a combination of whale-oil soap and crude petroleum would probably be found the best remedy. He did not think it safe to recommend crude petroleum for general use. The ordinary fruit grower would not use even the whale-oil soap in accordance with instructions, and he felt sure they would use crude petroleum in the same careless way, and trees would be killed. He believes that a frequent cause of injury from crude petroleum when applied with water is that operators when spraying, go over trunks and other parts of trees twice ; beginning on the trunk, they go over the tree and finish up again on the trunk, thus depositing two applications or twice the necessary quantity of oil, because the water evaporates quickly but leaves the oil on the tree. Imperfect work is frequently done from the difficulty of reaching the upper side of the high branches on the opposite side of a tree which is being sprayed. The best time to apply the spray, whether of soap or of crude oil, is in April.

A word of warning may be here inserted for the benefit of those who may wish to use crude petroleum with regard to the variation in the specific gravity of crude petroleum from different wells. Dr. J. B. Smith, who has certainly done more to test the value of this remedy than anyone else, says (New Jersey Bulletin, 146), after giving the specific gravity of several samples :—

'Thus thirteen samples register 50° or over, leaving 70 that run between 40° and 49°, the majority running nearer to 46° than to 44°, both in green and in amber oils. It is a fair requirement, then, for a straight crude petroleum that it should have a specific gravity of 43° or over, at a temperature of 60° Fahr.; anything less might be harmful; anything more than 45° is unnecessary.

The importance is thus shown of knowing what the specific gravity by the Baumé oil scale is before any sample is used by a fruit-grower upon his trees.

The San José Scale exists in Canada only over a small area of the province of Ontario, extending from Niagara around the western end of Lake Ontario as far as Burlington and westward through the counties bordering on Lake Erie, and, even in that area, although it is true that the scale has increased considerably during 1900, the outside limits of this area have not been extended, and it is only in certain orchards where the insect occurs. In addition to this the majority of the owners of these orchards understand now the danger of neglecting to treat their trees, and are adopting vigorous measures to control the pest. The area may be described in general terms as that part of Ontario where the peach can be grown commercially. All reports of the occurrence of the San José Scale in other provinces are erroneous. The only other province where it has ever been found living on trees, is British Columbia ; this was some years ago, and Mr. R. M. Palmer, the official Inspector of Fruit Pests, expressly writes on this subject :—

'Victoria, B.C., November 21.—You will be glad to know that there is no San José Scale in the province. Reports of the presence of this dreaded pest from Salt Spring Island and Cowichan district, upon investigation, proved to be unfounded. The "scare" arose from the fact that many apples affected with the "leaf-spot-fungi" developed a red-spotted appearance somewhat like the discoloration of the fruit caused by San José Scale.'—R. M. Palmer.

An important step with regard to this insect was taken by the Hon. Minister of Agriculture last spring in putting through an amendment to the San José Scale Act, by which under certain restrictions nursery stock was allowed to be imported into Canada from countries where the San José Scale was known to occur. When it was discovered that this insect could be killed on nursery stock by fumigating with hydrocyanic acid gas, at the urgent request of many fruit-growers, horticultural societies, nurserymen and others, by instruction of the Minister of Agriculture, proper fumigating houses were erected last spring at such points on the boundary as it was thought would be most convenient to importers, and qualified superintendents were appointed to treat any nursery stock, trees, shrubs or other plants as might be imported through these ports, and then repack and send them on to their destination as promptly as possible. For this fumigation with hydrocyanic acid gas the formula recommended by the United States Entomologist for dormant stock was adopted, it being the simplest effective formula, viz. : one fluid ounce of commercial sulphuric acid, one ounce of refined cyanide of potassium (98 per cent), and three fluid ounces of water to every 100 feet of cubic space—exposure 45 minutes. These fumigating houses were located at the customs ports of St. John, New Brunswick; St. John's, Quebec; Niagara Falls and Windsor, Ontario; Winnipeg, Manitoba; and Vancouver, British Columbia. The whole expense of these stations was assumed by the Dominion Government, but all shipments were made entirely at the risk of the shippers or consignees, the government assuming no risk whatever. The packages had to be addressed so as to enter Canada at one of the above named ports of entry, and the route by which they were to be shipped, clearly stated upon each package.

Many horticulturists and nurserymen availed themselves largely of this concession, and at every port much stock was imported from the United States and Japan. Nursery stock of all kinds can be imported from Europe without fumigation, as the San José Scale has never gained a foothold in European countries. Certain other plants which are not liable to the attack of the San José Scale are also exempted from treatment under the San José Scale Act. These are: (1.) green-house plants, including roses in leaf which have been propagated under glass; (2.) herbaceous perennials, including strawberry plants ; (3.) herbaceous bedding plants ; (4.) all conifers ; (5.) bulbs and tubers.

The fumigating houses were kept open with a superintendent constantly in attendance throughout the seasons of spring and autumn shipments of stock. Owing to the lateness of the season at which it was decided to do this work, the fumigating station for British Columbia was not operated until the autumn season of 1900, and, as all vegetation is much earlier in Oregon and Washington States, from which most shipments are made into British Columbia, it has been arranged that for that province the fumigating house shall be kept open for the winter months from October 15 till March 15. For Manitoba and the Eastern Provinces the spring season is from March 15 till May 15, and the autumn season from October 7 till December 7.

The San José Scale, although only occurring as stated above in a comparatively restricted area in the province of Ontario, has increased considerably in orchards which were infested last spring and other orchards adjacent to them. Nevertheless, the condition of orchards even in the area where trees are liable to become infested, is by no means hopeless. The Ontario Government has expert, capable and wise officials devoting their best energies to the discovery of a practical remedy ; and, although, from the lack of knowledge on the part of some fruit-growers, the work of controlling the San José Scale has been much hindered by the suspension of remedial measures in 1899, at the same time, the results of experiments show that much good can be done by treating orchards if this is done systematically. This treatment, however, in the present state of our knowledge, is both dangerous and rather expensive; but the former of these drawbacks will most probably be lessened or done away with by future experimenting, and the question of expense is merely a business matter of comparing outlay with returns, the same as has to be met in every branch of a fruit-grower's or any other business man's work. It is merely a question of whether the treatment pays or whether it does not. If it can be shown that a certain expenditure of money and labour will bring a profitable return, that is all the business man has to consider.

As an illustration of this, it will be worth the while of all fruit-growers living in that part of Ontario where the San José Scale occurs, to acquaint themselves with the actual facts of the present condition of Catawba Island, Ohio, in Lake Erie. A year or two ago this island was practically one large and very prosperous peach orchard. Later the San José Scale was imported and increased to the extent that the fruit prospects of the whole island were thought to be ruined. The natural excitement caused by this state of affairs stirred up the whole fruit-growing community to the adoption of energetic measures. By the advice of Prof. F. M. Webster, whale-oil soap was adopted as the universal remedy. Arrangements were made with Mr. W. H. Owen, of Catawba Island, to make a uniform grade of whale-oil soap, and this was applied to the trees throughout the island. As a consequence of this work, a large crop of fruit has been reaped from Catawba Island, where but for this concerted action only devastation and ruin could have existed. It must not be forgotten, however, that this action by the fruit-growers was almost universal, and nearly every orchard was sprayed regulary and at the time advised. Now, Prof. Webster expressly states that the San José Scale on Catawba Island is by no means exterminated, but that the fruit-growers have got it under control by a persistent use of whale-oil soap. They have simply reduced the pest to a point where it can be controlled ; but, just as sure as they give over their efforts for a single year, the insect will come to the front again, and, if two or three years were allowed to pass without treatment, a great many trees would be lost.

In one particular district in Ontario the fruit-growers protested strongly against the measures adopted by the Provincial Government to control the scale, but at the same time it was found afterwards that they had done nothing to treat their trees to prevent the scale from spreading. As a consequence, during the past season this district has become one of the very worst infested. There was at one time in the United States the same difficulty in persuading fruit-growers to treat their trees. Prof. Webster in his bulletin (No. 103, Ohio Agr. Exp. Station), 'The San José Scale Problem in Ohio, in 1898,' says: 'Heretofore it has sometimes been difficult to get the owners of some slightly infested orchards to apply whale-oil soap, but this season has taught them a lesson that they will not soon forget, for, while they stubbornly refused to treat their orchards last spring, they now have the rather humiliating spectacle of trees on their own premises almost if not quite totally devoid of fruit, while their more progressive neighbours, who invested their money in whale-oil soap and applied it faithfully, have plenty of fruit and no longer fear the San José Scale. Many orchards whose owners could hardly have been induced to treat their trees last season on suspicion of the San José Scale being present, will hereafter be treated on the slightest possible suspicion of the scale being present, and the owners will do it willingly.'

Prof. Lochhead, of Guelph, who has devoted much time and attention to the question of the San José Scale in Ontario, says, under date December 22, 1900 :

'This is the cloud which is hovering over the fruit-growers of south-western Ontario at the present moment. They recognize now that the scale has spread very widely during the past season, and has also increased in intensity. They know also now that no remedy need be applied in a slipshod fashion. To my knowledge the scale is spreading from new centres not previously known. The remedies are known, but it remains for the owners of orchards to follow the prescription closely which has been given by entomologists. The nurseries will be more closely watched than ever this coming year, so that no infested stock can possibly leave the grounds.'

It will be seen from the above precautionary measures, which are being strictly enforced by both the federal and the provincial governments, that every possible effort is being made in Canada to-day to control, if possible, this terrible pest, and to prevent by every means fresh introductions. Not only is every woody-stemmed plant imported into Canada from infested countries fumigated with hydrocyanic acid gas, but every nurseryman in Ontario is forced to submit to the same treatment every shrub and tree supplied to customers.

THE PALMER WORM
(*Ypsolophus pometellus*, Harr.).

Attack.—Slender greenish white caterpillars, reddish brown on back, with a central stripe down the middle, bordered on each side with white irregular bands ; when full-grown, a little over half an inch in length ; feeding on the leaves, and sometimes on the surface of the fruit.

Complaints of the work of this insect have been received from several localities during the past season, particularly from sections along the northern shore of Lake Ontario. It has also been found as far north as Ottawa. Judging from reports received, the Palmer Worm has confined its attacks chiefly to the apple. From a letter received from Mr. A. W. Peart, of Freeman, Ont., dated June 19, the following is extracted :—

'I enclose in small box some worms which are very plentiful here at present, working particularly on the apple. They vary in size from a ¼ of an inch to ⅝ of an inch in length. They are a light yellow with two stripes running lengthwise on either side of the back. Their most marked characteristic is their rapid motion. Take one in the palm of the hand, and touch it, it wriggles and jumps an inch or two with rapid lightning-like contortions. When you catch one, it is hard to hold. Like the cankerworm, it spins a thread when you disturb a branch, and lets itself down, and you can see it swinging ; but unlike the cankerworm, it does not loop in travelling. I find it in holes eaten in the young apples, and I think it is responsible for at least a portion of the cavity, if not all. On some trees, with their leaves badly riddled, you can find them by hundreds.'

Letters of a similar nature to the above have been received from Oakville, Adolphustown, and other points.

The life-history of the Palmer Worm is fairly well known. When the caterpillars are young they eat only the soft tissues of the leaves, but, as they mature, they devour the whole of the foliage, with the exception of the coarser veins. This is especially so when the larvæ are numerous. When the infestation is not of a serious nature, the caterpillars may be found feeding in a folded portion of a leaf. These larvæ are extremely active, and, as has been observed above, if a tree on which the caterpillars are at work is suddenly jarred, the larvæ will drop from their feeding places, and suspend themselves in the air by means of silken threads. If one is placed on any flat surface, it wriggles, and when touched moves with remarkable rapidity.

When full-grown, the caterpillar is a little over half an inch in length, and in general appearance is a greenish-white larva, with the dorsal area reddish brown, having a central dorsal stripe widely bordered on each side with white irregular bands, a little wider than the medio-dorsal stripe. The head is honey-yellow. The thoracic shield is transparent and inconspicuous, having the hind margin borderded with black for half its length, the black edge terminating with a hook forward on each side of the shield, leaving a wide central opening. The stigmatal fold is prominent. Along the dorsal area are two series of black piliferous spots, those on the anterior portion of each segment closer together than the others. Spiracles whitish, difficult to detect. The body bears a few slender bristles, one from each spot.

When mature the caterpillar changes to a chrysalis, usually in a fold of a leaf, and produces the moth in about fourteen or fifteen days. Those received on June 28 spun up on July 2, and the moths appeared on July 16 and 17. The moth is a delicate little creature of about five-eighths of an inch in expanse of wings. It is of a grayish-brown colour, with a purplish or golden reflexion ; some specimens are of a tawny yellow. The forewings are dotted with small dark chocolate-coloured spots. The margins of the dusky lower wings are deeply fringed.

Remedy.—The remedy for this insect is spraying with the arsenites. A hymenopterous parasite was bred from this species by Mr. C. H. Young, of Ottawa.

THE GREENHOUSE LEAF-TYER

(Phlyctaenia ferrugalis, Hbn.=*Botis harveyana*, Grt.).

Attack.—Slender semi-translucent green caterpillars, when full-grown, nearly an inch in length, with two distinct black spots (one on each side) close behind the head, the green dorsal vessel showing distinctly down the middle of the back, bordered on each side with a double white band ; feeding on the cellular tissue on the lower sides of the leaves. In many cases the leaves are drawn together by threads of fine silk.

In my last report the above insect was treated of at some length, and, as it is now still prevalent in the same locality (Toronto) and has appeared in other houses in Hamilton, I again draw special attention to it, for unless checked it is liable to spread and possibly become a serious greenhouse pest in Canada. In Toronto last year the larvæ did much harm, causing considerable loss to roses, but this year the species is also attacking violets and chrysanthemums. On November 12, Mr. Arthur Gibson, of this Division, paid a visit to the houses of Mr. J. H. Dunlop, Toronto, and specimens of the larvæ in all stages, pupæ and moths were found in some abundance. In one of the chrysanthemum houses especially, the insect was very prevalent and numbers of the moths were flying at the date mentioned. In this house some eggs were found, and these have since hatched in the office and proved to be the same species.* The eggs were laid on the under side of the leaves. They are flattened and remarkably like those of the Codling Moth, dirty-whitish, about one-half mm. in width, round, strikingly iridescent, the surface coarsely reticulated (which gives them a slightly roughened appearance), and are laid sometimes singly, in pairs, or in clusters of 3 to 7, the eggs of which overlap at the edges. The work of the caterpillars was only noticed on the underside of the leaves, and in the case of the mature larvæ large pieces of the soft tissue were eaten away. The caterpillars were generally found to be within a slight silken web, and in many cases two leaves were brought together and fastened by threads of silk, the larva feeding on the soft tissues on the underside of the upper leaf. The young caterpillar, as soon as it hatches from the egg, is about one-twelfth of an inch in length, and of a semi-translucent creamy-white colour, with a large black head. The body bears slender whitish hairs, and the skin is smooth and shining. After they have been feeding, the colour of the green food contents gives the caterpillars a slight greenish appearance. In the second larval stage, pale whitish stripes are present on the body, and these, as the larva passes through its other stages, become more distinct. When mature the caterpillars are about three-quarters of an inch in length, slender, semi-translucent, with the dark-green dorsal vessel showing distinctly through the skin, but rather faint on segments 2, 3 and 13. On each side is a double white sub-dorsal band which is also rather faint on segments 2, 3 and 13. On segment 2 are two distinct black spots, one on each side of the dorsal area. Head about one twenty-fifth of an inch in width, bilobed, smooth, shining, whitish, splashed with brownish blotches on cheeks and bearing a few pale hairs. Mouth parts brownish; ocelli black. Spiracles white and very small, joined by a faint whitish line. On segments 2, 3 and 4 this line is represented by a few faint white dots and is obsolete on segment 13. Thoracic feet and prolegs of the same colour as the body ; the thoracic feet each bear exteriorly two black dots, one above the other. The whole body is sparsely covered with slender pale hairs, the ventral surface being lighter in colour than the dorsal. When at rest these caterpillars have a habit of curling round to the side of the body their heads and the first three or four segments. The duration of the pupal stage is from seventeen to twenty days. The moth is of a rusty-brown colour, and when the wings are spread measures a little over five-eighths of an inch in width. When at rest it measures three-eighths of an inch at widest part. The wings are crossed with darker lines and also bear darker markings.

As to remedial treatment, the picking of the leaves on which the caterpillars are at work is recommended, and in the Toronto houses good work in this direction has

* Many eggs have since been secured from moths kept in confinement.

been done; large numbers of the moths have also been dislodged from their resting places and killed. The proper carrying out of such work, however, takes up too much time, especially if many large houses have to be gone over, and, as this insect is almost continuously at work when once established, no doubt fumigation with hydrocyanic acid gas is the quickest and most effective remedy.

A GREENHOUSE LEAF-ROLLER
(*Cacoecia parallela*, Rob.).

Attack.—Dull green caterpillars about an inch in length when full-grown, with yellowish-brown head and thoracic shield ; each segment but the first two bearing conspicuous white piliferous tubercles ; feeding on the foliage of rose bushes in greenhouses, drawing the leaflets together by threads of silk, or rolling a leaf up and spinning a web inside.

In my last report I recorded the occurrence of two new greenhouse pests in Canada, viz., the Greenhouse Leaf-tyer *(Phlyctaenia ferrugalis*, Hbn.), and the Black Violet Aphis *(Rhopalosiphum violae*, Perg.*)*, both of which occurred at Toronto. During the past year there was brought under my notice for the first time in Canada the work of another insect, attacking the foliage of rose bushes in greenhouses of Messrs. Webster Bros., at Hamilton, Ont. Specimens of the caterpillar were sent to the Division, and these have since been bred to maturity, and proved to be those of a small tortricid moth, *Cacoecia parallela*, Rob., somewhat resembling the Oblique-banded Leaf-roller, which has long been known to injure roses, particularly out of doors.

The caterpillars of *Cacoecia parallela*, Rob., were first noticed doing injury at Hamilton in June, 1899, and since then they have appeared in hundreds, causing great annoyance and damage. The larvæ were particularly prevalent during the present year, from the end of March until about the middle of October. The work of the caterpillar is much after the style of both the Greenhouse Leaf-tyer and the Oblique-banded Leaf-roller. It feeds on the green foliage and has the habit of drawing the leaflets together by means of threads of silk, or rolling a leaf over, spinning a web and feeding inside.

The caterpillar when full-grown is about one inch long ; it tapers slightly to each end and has the segments distinctly marked. The colour is dull green, overlaid lightly with velvety black, of a slightly darker shade on the dorsum. The piliferous tubercles are white and conspicuous, bristles long and slightly wavy. The head is round, slightly depressed in front, of a yellowish-brown colour, and bears some slender light hairs ; mouth parts and antennæ darkened; ocelli black. Behind each cheek, at the back of the head, is a black elongated blotch in line with the ocelli. Thoracic shield honey coloured, with two small back spots on the front margin, divided by the pale median line. The posterior margin of the shield is bordered heavily with black, which gradually enlarges into a wide blotch towards the apex. Like the double blotch on the front margin, these blotches are separated by the median line. Below the thoracic shield are two short tubercle-like chitinous dashes, the upper of which is immediately in front of the spiracle. Each of these dashes bears a pair of bristles. The anal shield is darkened towards the apex and bears several slender bristles. The conspicuous white piliferous tubercles are arranged as follows :—The sub-dorsal tubercles are widely separated, so as to bring them and those of the lateral series almost into line. The supra-stigmatal tubercles are immediately above and close to the small black-ringed spiracles, in some cases partially inclosing them. The infra-stigmatal tubercles are directly below the spiracles, and separated from them by twice their width. The supra-ventral tubercles lie in a line directly below those of the lateral series. There is a ventral series of large double tubercles which lie at the base of the prolegs and thoracic feet, and each of which bears two or three bristles. On segments

5, 6, 11, 12 and 13, there is beneath each segment a series of small ventral tubercles on each side of the medio-ventral line. The thoracic feet are shiny, black, white at joints, and almost ringed at the base with a narrow shiny black band, which is open on the outer side. The prolegs are concolorous with the ventral surface. All the feet bear short hairs.

When full-grown the caterpillars spin light cocoons among the leaves, two or three of which they gather together. The pupal period of specimens bred during the past season was about nine or ten days.

The moth, which, in a superficial way, closely resembles the well known Oblique-banded Leaf-roller, measures from three-quarters of an inch to very nearly an inch in expanse of wings, and in greenhouses there are several broods in the season. The colour of the upper wings is a pale brown, crossed obliquely by three bands of a much darker shade, the central one of which is clearly defined at its margins. The other two bands fill up the apical and basal areas of the wings. In many specimens the basal band is almost obliterated. The whole wing surface is loosely reticulated with indistinct basal lines. Under wings paler than the upper.

Fig. 17.—*Cacœcia parallela.* (After Prof. O. Lugger.)

Although rather smaller, this moth resembles the Oblique-banded Leaf-roller very much in general appearance, but it will be seen by the above description of the larva that these two insects are very different indeed in the caterpillar stage of their existence. The larva of the Oblique-banded Leaf-roller may in general terms be described as a green larva with a very dark brown, almost black, head, while that of the above is a blackish green caterpillar, with a yellowish head, and having the body conspicuously dotted with white tubercles.

Owing to their habits, the caterpillars are rather difficult to reach with remedies. Spraying with Paris green and water was tried to a limited extent, but it was not thought to have a sufficiently beneficial effect to continue the applications. This failure, it was claimed, was due to the way in which the caterpillars protect themselves. There is no doubt, however, that many of the larvæ were destroyed, and doubtless more would have been killed if the spraying had been continued longer at short intervals. In the above houses only two applications of Paris green were made, and as this did not appear to have good results, the caterpillars were left to themselves, and no further treatment was applied to the foliage. Late in the season (September) the moths were very numerous, and hand-picking of the larvæ was resorted to, a good sharp boy being sent through the houses early every morning to pick the caterpillars from the bushes. All the larvæ obtained in this way were burned.

Remedies.—As regards remedial treatment, of course, hand-picking of the caterpillars has certainly some beneficial result ; but, as I have pointed out in the case of the Greenhouse Leaf-tyer, the carrying out of such work carefully and properly, takes up too much time, especially if large houses have to be gone over. If the infestation is light, hand-picking will probably be all that is necessary, but when the insect is at all abundant in large houses, spraying or dusting with poisonous mixtures or fumigation with hydrocyanic acid gas are the most effective remedies. Fumigation with this gas, however, must be done carefully and strictly according to instructions, and if such treatment is adopted by any one to destroy greenhouse insects, unless they are fully posted on the matter, communication should previously be entered into with this Division, when full information will be cheerfully given. Hydrocyanic acid gas is now largely used to destroy greenhouse insect pests, but its very dangerous nature must not be overlooked.

SOME INSECTS OF SPECIAL INTEREST REPORTED TO THE DIVISION OF ENTOMOLOGY DURING 1900.

(Detailed Treatment of which in the Present Report is Precluded by Want of Space.)

FODDER CROPS.

THE CLOVER ROOT-BORER *(Hylastinus obscurus,* Marsh,=*Hylesinus trifolii,* Mueller).—Reported at a few places in Ontario. The worst occurrences in old clover fields at London, Picton and in a small patch at Ottawa. Remedies : A short rotation and the ploughing down of infested fields as soon as there is a pretty good growth after the hay has been cut.

THE LARGE CLOVER WEEVIL (*Phytonomus punctatus,* Fab.).—Larvæ found at Picton, Ont., on May 24, in large numbers, but so severely attacked by the parasitic fungus *Entomophthora phytonomi,* Arthur, that little injury was done.

THE GREEN CLOVER WEEVIL (*Phytonomus nigrirostris,* Fab.).—Occurring with the last named at Picton and also abundant in clover fields at Ottawa. Remedy : Early cutting. The larvæ feed chiefly in the sheathing bases of the leaves and in the flower heads.

ROOTS AND VEGETABLES.

CABBAGE WORMS (*Pieris rapae,* L.).—This common enemy of the market gardener was particularly abundant in all parts of Canada this year. Reported as abundant and destructive at Kaslo, B.C., by Mr. J. W. Cockle, who observed it first in British Columbia last year. For the first time this year it appeared on Vancouver Island, and did much harm to cabbages and mignonette in gardens (J. R. Anderson, R. M. Palmer and G. A. Knight). In Ontario it was destructively numerous in the counties north of Lake Ontario, injuring the turnip crop seriously ; also reported as one of the worst pests in Nova Scotia (Harvie Gray) and parts of Quebec.

Remedy : Dusting with Pyrethrum and lime (or some other dry diluent), and spraying with arsenical poisons in turnip fields.

ROOT MAGGOTS (*Anthomyia*) of Cabbages, Cauliflowers, Radishes and Onions.—Many experiments were tried with more or less success. On cauliflowers and cabbages the best results were secured by using the Gough tar-paper discs which have been reported upon previously. For the other crops, carbolized mixtures seem to be of greatest promise.

These insects are reported to have been unusually scarce at Nappan, in Nova Scotia, this season, and as a consequence good cabbages and cauliflowers were grown (W. S. Blair). At other points in Nova Scotia (K. McIntosh), New Brunswick and Prince Edward Island (Father Burke), they were as destructive as usual.

CABBAGE PIONEA (*Pionea rimosalis,* Gn.).—Destructive in turnip fields in Prince Edward Island (S. A. Stewart and G. F. McKinnon).

TURNIP APHIS (*Aphis brassicae,* L.).—A considerable amount of harm has been done by the Turnip Aphis in a few localities, but the complaints this season have been far less numerous than has usually been the case. The worst attacks have been in the counties of Huron and Bruce, where in some sections as much as half the crop of turnips was destroyed (H. Deacon).

Remedies : Spraying with kerosene emulsion or whale-oil soap solution, 1 pound in 6 gallons of water, at the time colonies first appear in August ; also ploughing down deeply the tops as soon as cut from the roots, as the eggs were found to be laid upon these in large quantities at Belgrave, Ont.

DIAMOND-BACK MOTH (*Plutella cruciferarum,* Zell.)—Very destructive in parts of Vancouver Island (G. A. Knight) and Saskatchewan (Percy B. Gregson).

FRUITS.

Codling Moth (*Carpocapsa pomonella*, L.).—This is still a cause of enormous loss to fruit-growers. Where systematic spraying is practised, supplemented by the banding of trees with strips of burlap or whisps of straw, the numbers have been reduced to a marked degree. Many practical fruit-growers might be cited from every province of the Dominion to prove this.

Plum Curculio in Apples (*Conotrachelus nenuphar*, Herbst).—For several years this insect has been a troublesome pest in the orchard of Mr. Jack, at Chateauguay Basin, Que. In the fall of 1899 the orchard was ploughed and the land has been cultivated most of the past summer, and, as a result, no injury has been done by the curculio, except where some raspberries were left growing among the trees.

Oyster-shell Bark-louse (*Mytilaspis pomorum*, Bouché).—There is probably no orchard pest in Canada which is wider spread than this and which has destroyed more trees. A practical remedy has long been a desideratum. The standard remedy, up to the present time, has been the kerosene emulsion ; but this has never been popular, owing chiefly, I think, to the trouble of making it and its destructive effects on rubber hoses. About five years ago it was noticed that trees sprayed with Bordeaux mixture were freer from this insect than those which had not been sprayed. This was due, it was thought, to the deposit of lime from that mixture which was left on the trees.

In the course of some experiments made on apple trees which happened to be badly infested with Oyster-shell Bark-louse on the Experimental Farm by Mr. W. T. Macoun, by spraying with a lime whitewash to retard the opening of flower-buds as a protection against late frosts, it was discovered that these whitewashed trees were very much cleared of the Oyster-shell Bark-louse, and subsequent experiment shows that this is probably an easy, cheap and effective remedy against this pernicious insect. The best time to apply the whitewash is late in the autumn, so that the scales loosened by the wash may be scaled off with the lime during the winter. Spraying trees during the winter is a very unpleasant operation, so this work should be done during the warm days of November, and the strength of the whitewash which has been found effective is from one to two pounds of lime in each gallon of water. A better coating of lime is deposited on the trees if two applications are made, the second being applied as soon as the first one is thoroughly dry.

Applications of concentrated lye, as supplied in tins for household uses, were also experimented with in varying strengths from 1 pound in 3 gallons of water, up to 1 pound in 6 gallons ; but they were not sufficiently fatal to the scale insects to justify their recommendation. Even at the strength of 1 pound in 3 gallons, although the leaves of some plants were spotted, no permanent injury was done. All the samples of concentrated lye which were obtainable were found to be caustic soda.

The Pear-tree Flea-louse (*Psylla piricola*, Foerster).—This insect is widely spread through the pear orchards of western Ontario, but seldom occurs in large enough numbers to attract attention. It is, however, a pest which pear-growers should watch carefully, and treat promptly if the numbers increase. Mr. George E. Fisher, a most accurate observer, with exceptional opportunities of examining orchards, writes : 'On several occasions I have noticed Pear Psylla doing very serious damage to pear orchards. When once established it multiplies very rapidly. Here at home a number of years ago I had 300 Dwarf Duchess trees badly infested, and even now, after spraying regularly, they do not seem to have fully recovered. My neighbour, Mr. J. S. Freeman, had a block of 400 Dwarf Duchesses so badly attacked that nearly all died. In 1899, Mr. E. J. Henry, of Winona, had an orchard badly affected. I am fully persuaded that this is not an insect to trifle with, but I do not dread it as much as I did, for I now know that by the use of an emulsion of crude petroleum and whale-oil soap I can destroy such insects as winter exposed on the trees. For Psylla one must operate early, because the eggs are laid early. In May, 1899, I visited a large Dwarf Duchess orchard belonging to Mr. Henry Lutz, of Youngstown, New York State. In 1896 this block of trees had been almost ruined by Psylla. In February, 1897, the whole block was sprayed heavily with lime, which destroyed the insect so completely that when I saw the trees two years after they appeared very healthy indeed.'

THE RED-HUMPED APPLE-TREE CATERPILLAR (*Oedemasia coneinna*, S. & A.).—Specimens of these caterpillars were sent from Kaslo, B.C., by Mr. J. W. Cockle. They were very prevalent at the time in apple orchards.

THE PEAR-LEAF BLISTER MITE (*Phytoptus pyri*, Sheuten).—Several inquiries about this have been received from British Columbia. Mr. Palmer reports : 'This insect continues to be a very persistent pest, and is quite generally distributed through the province. It is easily kept down by the use of the lime, salt and sulphur spray used in winter, but is difficult to exterminate and will reappear if spraying is neglected.'

THE BLACK VINE WEEVIL (*Otiorhynchus sulcatus*, Fab.).—Occasional references to injuries by this beetle have been made, chiefly to garden plants and in greenhouses in British Columbia. The beetle is not uncommon on the sea shore in Nova Scotia, but no injury to crops of any kind has ever been reported from that province until the past season, when specimens and an account of serious injury were received from Mr. J. H. Churchill, of Westport, N.S. Strawberry beds have been injured for many years, and among the samples received were several plants which were attacked, not only by the Black Vine Weevil, but also badly by the Strawberry Root-borer (*Anarsia lineatella*, Zeller), fortunately an uncommon enemy in Canada. This injury has been going on for about six years, during which time Mr. Churchill estimates his loss in strawberries at $1,500. In British Columbia, Mr. Tom Wilson, of Vancouver, observed another occurrence of the Black Vine Weevil, where considerable injury was done to strawberry plants and primroses. In Europe this beetle is known to be a troublesome pest of grapes, strawberries, raspberries, mangels and primroses, but up to the present time nothing of importance has been recorded against it on this continent. The strawberry plants sent by Mr. Churchill from Nova Scotia on July 8, contained grubs and pupæ of the beetles, and in another parcel received on September 19, there were grubs, pupæ, and beetles, some of the latter being immature, but a few perfectly coloured. The only remedy which can be suggested for this beetle as yet is the planting of strawberries in new ground, and frequent renewal of the beds, the worst injuries being done to old plants.

In this connection I may add that Mr. W. T. Macoun, the Horticulturist of the Central Experimental Farm, tells me that he considers the single crop method of growing strawberries the one which pays best, the fruit being finer and the land being kept clean much more easily. Some varieties which do not make runners freely should be left for two years.

Nepticula (*Micropteryx*) *pomivorella*, Pack.—This interesting little insect has been more than usually abundant in western Ontario during the last two years, and a large series of specimens have been reared. The larva is a leaf miner, but when full grown, leaves the mines and spins small cocoons on the twigs of apple trees, in which it passes the winter. It has been lately discovered by Mr. A. Busck, of Washington, that this insect, which was described as a *Micropteryx*, is a true *Nepticula*.

THE LESSER APPLE WORM (*Semasia prunivora*, Walsh).—Mr. R. M. Palmer reports that this insect occurred in nearly all the fruit-growing districts of British Columbia excepting the Okanagan valley, but in smaller numbers than in 1898-9. He draws attention to the fact that this pest is still often mistaken for the true Codling Moth, by fruit-growers, but he is pleased to report that the latter has not occurred in any part of the province, although watched for carefully. A most rigorous inspection is maintained of all fruit coming into the province, so as to prevent its introduction by that means.

THE APPLE FRUIT MINER (*Argyresthia conjugella*, Zell.) appeared in small numbers on Vancouver Island during July, but no instance of its presence in large numbers was reported.

The MEALY PLUM APHIS (*Hyalopterus pruni*, Fab.) was very prevalent in many parts of British Columbia. Spraying with whale-oil soap and quassia proved an efficient remedy.

The MEDITERRANEAN FLOUR MOTH (*Ephestia kuehniella*, Zell.).—A mill badly infested with this insect, near Ottawa, was fumigated with sulphur with satisfactory results. An interesting observation was that the larvæ were largely parasitized by a small hymenopterous insect, which has been found by Mr. W. H. Ashmead to be a new species, and has been named by him *Idechthis ephestiae*.

The RED TURNIP BEETLE (*Entomoscelis adonidis*, Fab.).—This native beetle, which is bright red with three black stripes down its back and a spot on the collar, and is $\frac{3}{8}$-inch long by $\frac{1}{4}$-inch wide, was very abundant in the North-west Territories and parts of Manitoba last year. Several inquiries were received concerning its habits, and it was observed almost everywhere during July, chiefly upon cruciferous weeds, but also on turnips, radishes, &c. Upon a piece of neglected summer-fallow at Kinistino, Sask., it was seen in thousands upon the steeple-like plants of the Gray Tansy Mustard (*Sisymbrium incisum*, Engl., var. *Hartwegianum*, Watson) and upon *Erysimum parviflorum*, Nutt., and *Erysimum asperum*, DC., a near relative of the garden wallflower. This insect has been treated of at length in my report for 1892.

'Strathcona, Alta., June 1.—I send you some beetles which are abundant, climbing up the stems of some weeds on about half an acre of timothy : they come out of the ground, which I dug up and found the holes about $\frac{1}{2}$ to $\frac{3}{4}$-inch deep. Are they likely to hurt the timothy ? I have seen them before, but not so plentiful as now.'—THOMAS DALY.

'Strathcona, June 12.—I send a sample of a beetle which has been doing great damage in my garden, attacking wallflowers and stocks, all young plants ; they are now on my turnips, radishes and cabbage. I have killed probably 1,000. What are they called, and what is the best remedy ?'—JOHN H. WILSON.

'Souris, Man., September 13.—I am sending an insect which is doing much damage in gardens in the Souris district, especially at this time.'—ROBT. I. CRISP.

This beetle, both as a grub and in the perfect state, attacks all cruciferous plants. The best remedy is to spray or dust the plants attacked with arsenical poisons in the same way as for the Colorado Potato Beetle. The grubs are nocturnal in their habits, and are seldom seen.

This is also a European insect, but there is hardly a doubt that it is a native species in the North-west. In certain seasons it is very abundant, and may at any time develop into a serious enemy of the agriculturist. It belongs to the Chrysomelidæ, the family to which also the Colorado Potato Beetle belongs.

The ASPARAGUS BEETLE (*Crioceris asparagi*, L.).—The Asparagus Beetles, treated at some length in my last report, have occurred again in the Niagara district during the past season, but do not seem to have been the cause of much injury. However, their attacks have been supplemented by another enemy, the Asparagus Rust (*Puccinia asparagi*, DC.), and one of the Hemiptera (*Cosmopepla carnifex*, Fab.) was found upon asparagus by Mr. Frank Arnold, at Queenston, Ont. These clustered on the plants in very large numbers during the last week of July. No special injury was noticed at that late date, and it was not thought worth while to advise any remedial treatment. Spraying with either kerosene emulsion or whale-oil soap would doubtless destroy them, should they at any time prove troublesome.


Fig. 18.—Squash Bug.

The SQUASH BUG *(Anasa tristis,* DeG.).—This troublesome enemy of the gourd family is a regular pest in western Ontario, but is seldom heard of in the eastern counties. In the last week of June specimens were sent from Inverary (Frontenac Co.), Ont., by Mr. Alex. Ritchie, with the complaint that they were destroying his squash, pumpkin and cucumber vines. The remedies recommended for this insect are :—

1. Hand-picking, which is claimed to be the most practical remedy. This is done early in the morning, during the cooler hours of the day, while the bugs are sluggish.

2. Traps. If shingles or short pieces of board are placed among the plants, the bugs will hide beneath them at night, and can be destroyed before they become active and leave these retreats the next morning.

3. The young bugs can be destroyed by spraying with kerosene emulsion or whale-oil soap.

ARMY WORMS IN WINTER.—A rather curious occurrence of the Army Worm in winter took place at Alberton, in Prince Edward Island, last February. This was reported to me by my esteemed correspondent, the Rev. Father Burke, of Alberton, who also sent specimens for identification from the farm of Mr. John T. Weeks, of the same place. The occurrence is described by Mr. Weeks, as follows :—

'Alberton, P.E.I., February 17.—I am in receipt of your letter of 8th instant, and am surprised to know that we have such a pest in our midst. The specimens I sent were supplied by my brother. He is going to try and get you some more specimens, and if he is successful he will forward them in the way you suggest. He says he saw them as he drove across several farms, and they were quite a long distance from bare ground.'—J. T. W.

'February 19.—This morning my brother came in with some more of the army worms. I am sending them in a tin box with some moist earth and some grass. These are much larger than the first I sent, but among the lot are several very small ones, which are apparently dead ; but I send them so that you may see the different stages of development. My brother tells me he saw them on at least half a dozen farms, and would have had no difficulty in picking up a hundred. We had an easterly snow-storm all day yesterday, which will probably cover them up again. I fear they seem to be pretty well distributed. To what extent are they known in Canada ? What is the remedy ?'—JOHN T. WEEKS.

In reply to these letters it was explained that the Army Worm passed the winter partially grown, in a torpid condition, near the surface of the ground, and that there were previous instances where they had appeared suddenly on the surface of snow during winter. It was suggested that this appearance in winter might prove beneficial, because many thus disturbed in winter perished. The distribution of the species in Canada was given and reports of this Division were sent, in which the usual remedies are stated.

In a report on the insect injuries of the year, Father Burke informs me that no injury whatever by the Army Worm was noticed during the past season.

THE BLACK BLISTER BEETLE (*Epicauta Pennsylvanica*, DeG.).—Injuries to potatoes by the Black Blister Beetle are reported from Dugald, Man., by Mr. Kenneth McLeod, from different parts of Ontario by Mr. C. W. Nash, of Toronto, and from Inverary, Ont., by Mr. W. T. McClement, who had also found them on the farm of Mr. John Guthrie, of Perth Road (Frontenac Co.) Ont., where, he says, they ate the tops of potatoes very cleanly, and were very active. If plentiful in a district, they would be worse than the Colorado beetle, for they are much more active. They flew ahead of the poison-can and ate the tops which were not poisoned, avoiding those dusted or sprinkled, and clustered thickly on the clean tops. They were plentiful about July 25. They were not widespread, but troubled only a few fields, and these near together.

The habits of Blister Beetles were explained to these correspondents, and also the connection of these insects with various species of locusts, upon the eggs of which the larvæ are predaceous parasites.

Specimens of an allied western species, *Cantharis cyanipennis*, Say, were also sent from Ducks, B.C., by Mr. Hewitt Bostock, who had found them injuring pea-vines in his orchard.

THE APIARY.

As in previous years, the sole management of the Apiary has been in the hands of Mr. John Fixter, the Farm Foreman. The season of 1900 has been a particularly poor one in the greater part of Ontario, but by the exercise of care and attention the colonies were housed in good condition, and as far as can be judged at this date are wintering well. Several meetings of bee-keepers were attended by Mr. Fixter, and addresses were delivered by him on practical apiculture, which were highly appreciated by his hearers. I myself had the pleasure of attending the annual meeting of the Ontario Bee-keepers' Association, at Niagara Falls, Ont., on December 5 and 6, and by request gave an address upon the Fertilization of Flowers by Bees. There was an interesting discussion upon the question whether bees could injure ripe fruit before the skin was broken ; careful experiments were cited showing that this was not the case, though bees will sometimes take advantage of a crack in the fruit or of an opening made by wasps or other insects, and will suck the juice.

REPORT OF MR. JOHN FIXTER.

Experiment in Feeding Sugar Syrup for Winter Stores.

During the winter of 1899, and the spring of 1900, great trouble was experienced with dysentery among bees in many parts of the country. The disease was thought to be due to food or honeydew gathered in the autumn. An experiment was started last autumn with four colonies. All the natural stores were extracted on September 17. A Miller feeder was placed in an empty section super, close to the top of the brood frames, any part of the brood frames not covered by the feeder being covered with a propolis quilt cut so as to allow the bees a passage through it or on its side. By keeping the feeder well packed, except where the bees enter, the heat is kept in and at the same time the bees cannot daub themselves with the liquid. In this experiment the bees had a constant supply of syrup. This syrup was made of the best granulated sugar, two parts to one part of water by weight. The water was first brought to a boil, then the boiler was set back on the stove and, the sugar having been poured in, the mixture was stirred until the sugar was all dissolved. This syrup was supplied to the bees at about blood heat.

At the beginning of the feeding the average weight of the hives and colonies was 33½ pounds, and at the close 52½ pounds. It required 80 pounds of sugar to make up the weight of the four colonies to carry them through the winter and spring successfully. The weight of water used to make the syrup should not be taken into account, as it is afterwards all evaporated during the winter.

Experiments in Wintering, 1899-1900.

Experiments in wintering bees were continued in the cellar, in a root-house, in the house apiary and in a pit dug in a hill side. The results were very much the same as those described in the report for 1898 (at page 213).

THE SEASON OF 1900.

March 10.—The temperature being 41° Fahr., and the day bright and calm, eighteen colonies were removed from their winter quarters; of these six were again placed in the exposed apiary, when there was about 18 inches of snow on the ground; six were placed in the sheltered apiary, where there was also considerable snow; and six were placed in the house apiary. As soon as they were settled on their stands, the bees all began to fly at once, the weather being fair and calm. They were thus enabled to cleanse themselves and return; the snow was discoloured for a considerable distance around the hives. Very few bees were noticed which were unable to return.

March 31 and April 1 being fine and warm, the colonies of all three apiaries had good cleansing flights. From April 2 to 6 there was very little flying, the weather being cool and windy. On April 7 the bees in the house apiary and in the sheltered apiary were flying well, while those in the exposed apiary could scarcely be seen to move out.

The balance of the colonies were taken from their winter quarters on April 8, the temperature being 44°. The weather was too cold for the bees to come out to have a cleansing flight until April 11, when the temperature rose to 54°, and all began to fly. The colonies first set out were flying as well as is usual in the month of May.

From April 11 to 18, there was very little flying, on account of cool winds and wet weather.

On April 18 an examination was made of the colonies set out early in the different apiaries, and of those set out later, that is, at the usual time; the purpose being to find out whether any difference could be seen as to the strength of the colonies. In every instance, we found that those set out first, more especially those in the house and sheltered apiaries, had more brood and eggs, and appeared to be very much more active than those set out later. When once they get a good cleansing flight, whether through activity or from getting water, whatever may be the cause, more brood and eggs are found in the hives. I would advise setting the bees out just as soon as they can fly out safely. The colonies which are set out a few days earlier will be by so many days further advanced at the beginning of the honey flow, that is, those set out later will require so many days more to become as strong after the beginning of the honey flow.

On April 18 the temperature went up to 69°. The snowdrops and squills blossomed, and the bees were seen to work on them at once. On April 20 and 21, the swamp willow, soft maple and Manitoba maple came into bloom. This time would have been too late for the removal of the bees from their winter quarters, for they would before this have become restless; many would have left their hives and been lost on the cellar floor.

From April 19 to 25 the bees were seen gathering pollen or sap running from the trunks of hard maple trees that had been injured.

April 26.—Very high wind, increasing to a hurricane in the afternoon—the day of the big Hull and Ottawa fire.

April 27 to May 7.—Weather very fine; all colonies working well, gathering pollen and honey. Every colony was building up rapidly.

At this time, and also from the blossoming of fruit trees to that of clover, the greatest care is necessary, so that there may be no check in brood rearing. When the queen stops laying, or when starved brood or dead larvæ are observed in the hives, many beginners, and even many experienced men, imagine that the cause is some disease, and at once send for the Inspector of Foul Brood. An instance of this is given on a later page (Appendix A), with the answer of the Inspector of Foul Brood (*see* page 247).

May 8-10.—Very cold winds; scarcely any flying.

May 11-16.—Very fine weather; bees working well.

May 17 and 18.—Very dull and cold ; scarcely any flying.

May 19 to June 7.—The bees gathered a great amount of pollen, but very little new honey ; nearly every hive was full of brood and young bees.

The first drones were noticed on May 28. A considerable amount of honey and syrup was fed from May 1 to June 8 in order to keep up brood-rearing and to prevent starving.

On June 7 and 8, White Dutch Clover and Alsike came into bloom, and there were many flowering trees and shrubs in bloom, but there was very little increase in honey.

June 8 to July 15, the bees gathered a small amount of honey from clovers and basswood.

On July 15 the first honey was taken off ; bees were very thick on flowers ; but there was very slight increase in weight of hives during the latter half of July.

After August 3, the bees gathered very little honey, and there was no increase in weight of the hives. The autumn flowers gave no surplus, and, there being no buckwheat sown in this district in 1900, no honey was gathered from that source.

September 1 to 10.—All colonies and hives were weighed in order to ascertain how much they had lost or gained. They were weighed again on October 1 and on November 12, just before they were put into their winter quarters. Any colony and hive found to weigh less than 50 pounds on September 1 was either given full frames of sealed honey or fed syrup to make up the difference in weight. While our experiments show that each colony consumes only from 9 to 14 pounds during the winter, it is a very wise policy to have 10 or 15 pounds extra in each hive to be used in spring before the honey flow.

Average weight of forty colonies and hives :

On October 1, $51\frac{3}{4}$ pounds.
On November 12, 49 pounds.

The forty colonies had therefore lost altogether 110 pounds. The greatest loss of any colony was $4\frac{1}{2}$ pounds, the smallest $\frac{1}{2}$ pound.

All were put into winter quarters on November 12.

List of Plants, Trees and Shrubs on which the bees were seen working well during the summer, and dates at which the visits were first noticed.

April 18—Snowdrops and squills.
" 20—Manitoba maple and soft maple.
" 21—Willows in swamps and on lawns.
May 10—Tulips.
" 11—Plum and apple trees.
" 12—Dandelions.
" 19—Wild black cherry tree.
" 22—Grape hyacinth.
" 22—Garland Flower *(Daphne Cneorum)*.
" 23—Vinca, several varieties.
" 23—Anemones and alpine poppies.
" 23—*Adonis vernalis*.
" 23—*Doronicum Caucasicum*.
" 24—Sand cherry.
" 24—Currant bushes.
" 24—Siberian Pea-tree *(Caragana)*.
" 25—Pear and cherry trees.
" 25—Lilacs, several sorts.
" 25—June berry.
" 25—Polemoniums.
" 27—Pæonies and Irises.
" 29—Honeysuckles and barberries.
" 31—*Pyrus baccata*.
" 31—Mountain Ash.
June 1—Strawberries.
" 2—Buckthorn bushes and hedges.
" 4—Forget-me-not.
" 4—Ginnalian maple.
June 4—Rhubarb.
" 4—Mountain Centaury.
" 4—*Ajuga Genevensis*.
" 4—*Anemone narcissiflora*.
" 7—White Dutch clover.
" 8—Alsike and sainfoin.
" 8—Raspberries and blackberries.
" 8—Sharp-leaved common Cotoneaster.
" 8—Alliums.
" 8—*Rosa rugosa*.
" 8—*Spiræa VanHouttei*.
" 12—Golden-leaved Spiræa.
" 12—Highbush Cranberry *(Viburnum Opulus)*.
" 14—Geraniums.
" 14—Wild vetch.
" 19—Large red poppy.
" 19—Strawberry-flowered Cinquefoil.
" 10—*Lupinus*.
" 21—Golden Groundsel.
" 21—Wild Mustard.
" 21—*Dictamnus*.
" 23—Locust.
" 23—*Rosa multiflora Japonica*.
" 24—English horse beans.
" 28—Broad-leaved Bellflower.
" 28—*Anchusa altissima*.

July 1—Sweet clover *(Melilotus albus).*
" 8—Asparagus.
" 8—Grass Peas.
" 8—*Lathyrus sylvestris Wagneri.*
" 8—*Eremurus altaicus.*
" 8—*Sedum Kamtschaticum.*
" 8—*Thalictrum aquilegifolium.*
" 11—Basswood.
" 14—Lilies, different varieties.
" 14—*Veronica*, different varieties.
" 14—Mulleins.
" 15—Double Queen of the Meadow.
" 15—*Linaria.*
" 15—*Asclepias tuberosa.*
" 15—*Agrimonia.*
July 18—Mignonette.
" 23—*Hypericum Kalmianum.*
" 27—*Echinops Ruthenica.*
" 28—*Lychnis.*
" 30—*Solidago.*
Aug. 9—Button Bush *(Cephalanthus occidentalis).*
" 9—Pumpkin.
" 9—Late-sown English horse beans.
" 11—Campanulas and Rudbeckias.
" 21—Sunflowers.
Sept. 1—Wild Asters.
Oct. 4—African Marigold.
" 4—Gaillardias.

Experiments with Comb Foundations in Sections.

As there has been in connection with the production of comb-honey a difference of opinion as to the proper size of foundation to use, a thorough test was made with comb foundation of different sizes in the sections.

The results show that it is of great importance that the sections should be filled up to the sides and bottom with comb foundation. On examining the different sections in this experiment, it was found that the smaller the piece of foundation was, the more holes or gaps there were around the comb in the sections, and the comb was thus less firmly fastened around the sides and bottom to the wood.

The following sizes of comb foundations were tested :—

1. Full sheets fastened at the top and fitting closely to the sides and down close to the bottom.

4. Two inches square in centre of top section.

3. Quarter sheets across upper end.

4. Two inches square in centre of top of section.

5. One inch square in centre of top of section, besides a narrow strip of about half an inch across top and bottom.

6. No foundation at all.

From past experience, I would recommend that full sheets be always used. The bees worked on the full sheets first, and these were filled more evenly and very much better.

Many inquiries are made why bees will not work in supers, when the other colonies in the same apiary are working on drawn combs in extracting frames. The explanation is that the pieces of foundation in the sections were too small. Many bee-keepers, even experienced bee-keepers, do not put much foundation in the brood chamber when hiving new swarms, though they put full sheets in the supers ; consequently, the bees fill the sections in the supers first.

The experiment with different makes and sizes of hives was not completed owing to the very poor season.

House Apiary.

The House Apiary has again been tested and has worked very satisfactorily, as far as summer management is concerned ; but, for wintering, every one of the past six winters it has proved to be a failure.

Returns.

The experience of the past season has been a repetition of that of 1899. Reports from most parts of Ontario and Quebec show that there has been a very poor honey flow, poorer even than 1899. In many places no surplus was secured, and bees have had to be fed more or less during the autumn.

Swarming was also poor on account of the shortage of honey. All the swarms that came out at the Experimental Farm Apiary were made to go back to the mother hives or were put with weak colonies ; 18 of the old colonies were doubled up, leaving now on hand 42 colonies.

The returns from the experimental apiary show an average of only 13 sections per colony. The colonies which were run for extracted honey gave 19 pounds per colony.

John Fixter.

Appendix A.

An Ontario bee-keeper wrote as follows to Mr. Wm. McEvoy, Inspector of Foul Brood for Ontario :—

'Dead brood appeared in half of my colonies. There would be from one to five or ten dead larvæ in a colony, and some of these I often found in capped cells, when I opened them with a penknife.

'I tried the starvation plan. Several of the colonies I starved twice, as the larvæ continued dying. I even destroyed two sets of foundation. Just think of the time and patience required to look into every cell in 80 colonies ; this I did several times. I had made up my mind to clean them up. I have melted many a score of white combs and super combs. I wish to be first on your list for inspection next summer. I may buy a lot of colonies which will be subject to your inspection.'

Mr. McEvoy's answer is full of valuable information :—

'Your colonies ran out of unsealed honey while they had a large quantity of brood on hand to feed, and then your bees did not uncap the sealed stores fast enough to keep pace with the amount of brood that required feeding, and the result was that considerable brood died of starvation. And some time after that the brood would suffer in proportion to the length of time that the brood nest was short of unsealed stores, and it would end in an increase of starved brood, which the bees would allow to remain in the combs for some time after the honey flow commenced. You never would have found one cell of dead brood in any of your colonies if you had kept them well supplied with unsealed stores. You may say that I am very much mistaken as to the cause in your case, but I am not ; I have travelled over every inch of this line for fully twenty years and from close observing, feeding and watching results, I have found that such is the cause why the bees fail to feed all the brood at certain times.

'On the night of May 28, 1889, we had a killing frost all over the province of Ontario, which was followed by several days of wet weather. That frost coming at the end of one of the warmest and most favourable springs ever known for bees, was a serious thing, because it caught all hives full of brood and suddenly stopped all the honey flow at the time when every colony had an immense quantity of larvæ to feed. I warned every bee-keeper at that time that he could look out for a wholesale starvation of brood and a very small crop of honey if he did not go to work and feed his bees so as to give them a chance to feed the larvæ. I kept my brood chambers well supplied with unsealed stores (through uncapping and feeding) until the honey flow began again. By thus doing, I secured one of the largest yields of honey I ever took, and I did not see one cell of dead brood. Late in the summer of 1889, many a bee-keeper became very much alarmed when he found his brood chamber in a rotten state with dead brood. Spraying of combs, starving the bees, and other methods were resorted to, to stamp out the dead brood. If these men had gone to work right after that great frost of May 28, and kept the brood chambers well supplied with unsealed honey through uncapping a part of the old sealed stores at one time, then another afterwards, and so on until the honey flow began again, they would have had

the most of the old honey used up and more space filled with brood; at the same time they would have had an increase in the number of the bees and would have secured a much larger yield of honey; there would have been also no dead brood. The very wet weather that set in all over the province in the last half of May and first week in June, was very hard on the constitution of thousands of colonies, because it prevented any honey gathering during that long rainy time, and after the bees used up the unsealed honey (a thing they always use first) they did not uncap the old sealed stores fast enough to keep pace with the large quantity of larvæ that required feeding; the result was a lot of starved brood, weak colonies and a small honey crop in many places. During the three weeks of wet weather I kept my colonies well supplied with unsealed honey by uncapping the sealed stores from time to time until all was used up, and after that I fed the bees until they commenced to gather honey. When the honey season opened, the combs in every brood-chamber were full of brood, and a large number of bees were hanging out on the front of every hive. I then put supers on, and from ninety colonies in that off season I took over 10,000 pounds of clover honey and left abundance for the bees to winter on. Last season I kept my colonies supplied with unsealed honey between fruit bloom and clover bloom, and when I finished extracting the balance of my crop in the fall I found I had taken over 11,000 pounds of clover honey from 100 colonies, and left plenty to winter the bees. You say that you tried the starvation plan and the dead brood showed up again; also that you starved several of them twice. I am certain that dead brood (starved brood) would not have shown up again after you put the bees on foundation, if you had fed the bees freely until they began to gather honey. You also say that many a score of white comb you melted. What a loss! These beautiful combs should not have been melted. With different management you could have made $250 or more, and saved all the combs and yourself from a world of worry.'
—J. McEvoy.

WEEDS.

SPRAYING FOR DESTRUCTION OF MUSTARD.

In my last report an account was given by Mr. Frank T. Shutt, M.A., F.R.S.C., Chemist to the Dominion Experimental Farms, of some experiments carried out by him, with the assistance of the Horticulturist of the Central Experimental Farm, to test the efficacy of the French method of eradicating Wild Mustard by spraying infested growing crops with solutions of copper sulphate. The conclusion arrived at from these experiments was, that a 2 per cent solution of copper sulphate, applied at the rate of 50 gallons to the acre, when the mustard plants were young, was the most effective, safest (as regards the grain crops) and most economical to use. The average cost of this application would be $1 per acre.

During the past summer, the Horticulturist, having men and horse-power at his disposal, again tested this remedy, and the results were again successful, although the experiment was carried out rather late in the season, and under certain other disadvantages as to the nature of the crop infested and the weather which prevailed at the time.

Mr. Shutt has drawn my attention to an important article on the subject, entitled 'The destruction of Charlock,' by Dr. J. Augustus Voelcker, in the Journal of the Royal Agricultural Society of England, vol. X, pt. 4, pp. 767-775, which, on the whole, confirms Mr. Shutt's conclusions and gives much valuable information on the subject. One quotation from a report made by Mr. Wm. Carruthers, the Consulting Botanist of the Royal Agricultural Society, on some of the experiments referred to, is of particular interest to Canadian experimenters, who have been disappointed at the results sometimes obtained when spraying has been tried for the destruction of mustard in districts where the Bird Rape (also called Kale, or Smooth-leaved Charlock) is abundant. This is particularly the case in Manitoba, where by far the greater proportion of the plants called Wild Mustard are really Bird Rape *(Brassica campestris*, L.) 'I have not been able to detect anything in the structure of the Charlock that should make it so readily a prey to the copper sulphate. This is still more remarkable when we find that it does not in the least injure another species in the same genus, which in Cumberland is known as the "Smooth-leaved Charlock." This plant, the *Brassica campestris* of Linnæus, is very common in some districts. A correspondent in Cornwall writes that it is very common in his county. He has observed that while the common Charlock is easily destroyed by copper sulphate, the smooth-leaved plant is quite uninjured by it. This is probably the explanation of the difference in the testimonies as to the influence of copper sulphate on Charlock. The two plants so closely resemble each other that only a careful observer can distinguish that they differ. The true Charlock *(Brassica Sinapistrum*, Boiss.) is destroyed by treatment, while the smooth-leaved Charlock (*Brassica campestris*, L.) is not affected.

'As the general outcome of Mr. Hornsby's experiments, it would seem that for Charlock when still young, 40 gallons per acre of 2 per cent solution of sulphate of copper would be found effectual, but that, if the Charlock were already in flower, as much as 60 gallons of a 4 per cent solution would be required.'

REPORT OF THE POULTRY MANAGER.

(A. G. Gilbert.)

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I beg to inclose herewith the thirteenth annual report of the Poultry Department.

Some space has been devoted to the results of observations made during the past three spring seasons in connection with the hatching of early eggs from hens which laid all winter and were gently stimulated to do so. The conclusions arrived at will doubtless be useful to the many persons interested.

The matter is an important one, as it has direct bearing on the profitable results, or otherwise, attached to the hatching and rearing of early chickens by artificial or natural means. It is well worthy of further careful scientific investigation.

Information is also given, in detail, on the several points of poultry raising and best methods of fattening, killing, dressing and packing of the birds for shipment to British markets, or for home consumption.

The characteristics of the leading Standard breeds are described and the weights of the fowls given. Cuts of the leading breeds are also given.

During the year addresses on subjects akin to my department were delivered at the following places, viz. :—

Ontario.—Peterborough, Lansdowne, Gananoque, Toronto, Guelph, Renfrew.

Quebec.—Brigham, Mansonville.

Prince Edward Island.—Marshfield (2), Alberton, Centreville (2), New Glasgow, Montague Bridge, Murray Harbour South, Eldon, Kensington, Tyne Valley, St. Peters.

British Columbia.—Lulu Island, Central Park, Port Hammond, Abbotsford, Mission City, Chilliwack, Metchosin, Royal Oak, Ganges Harbour, Duncan's, Ladner's, Surrey Centre, Agassiz, Langley.

Manitoba.—Neepawa, Portage la Prairie, Carberry, Brandon, Winnipeg, Emerson, Morris, Morden, Manitou, Pilot Mound.

A feature of the Renfrew meeting was a large display of dressed poultry, consisting of turkeys, geese, ducks and chickens. The birds were divided into numerous classes, for which prizes ranging from $7 to $1 were given. This brought out a large number of competitors. Several chickens dressed in most approved methods were taken from our poultry department. At the meeting held in the afternoon, after the fair, the manner of plucking, dressing and drawing the chickens was explained. The object lesson was much appreciated.

I have again the pleasure of testifying to the faithful services of Mr. George Deavey.

The marked increase in correspondence and requests for information in regard to all phases of poultry keeping, is an evidence of the rapid development of that branch of farm work.

I have the honour to be, sir,
Your obedient servant,
A. G. GILBERT.

Central Experimental Farm,
Ottawa, November 30, 1900.

REPORT ON THE WORK OF 1900.

The farmers of the country, with other poultry keepers, have, during the past two years, given more attention to the artificial hatching and rearing of chickens than ever before. As a result, during the past year a large number of letters have been received asking for information on the subject.

At present the artificial hatching and rearing of chickens is carried on in two ways, viz. :—

1.—By joint stock companies, with large plants, in charge of practical proprietors, or expert managers.

2.—By farmers and small poultry keepers, who use one or two incubators and outside brooders, and whose operations are comparatively limited.

In the first case, the aim of the companies is to make the egg product of the most value by converting it into early broilers, to sell at $1.25 to $1.50 per pair during the high-price season. In some cases operations are continued the greater part of the year. In others the sale of eggs from thoroughbred stock for hatching purposes in spring, and eggs for eating purposes during the winter time of high prices, are combined.

In the second case, the aim of the farmer seems to be :—

1. To raise as large a number of early chicks at the same period as possible, and so have them of uniform age.

2. By so doing to avoid comparatively late hatching by hens.

3. To secure a number of pullets, of same age, to make early layers.

4. To have a large number of early cockerels of uniform age to sell when prices are highest.

There are two methods by which the farmers may attain their object, viz. :—

By filling the incubator and beginning operations in late February, or, early March.

By deferring hatching operations until the middle of April, by which time the hens have had a run outside, and as a result their eggs will hatch better.

Experience has shown that there are difficulties to be met with, in the first method, in the shape of weak germs and weakling chickens, and that until a remedy is found for these obstacles, the farmers will find the second method slower, but certainly surer, in the attainment of their object. The difficulties in connection with the first or earlier method are enumerated and discussed further on, as well as investigation in connection with them, so far as made.

Up to date the experimental work in our poultry department has been conducted in connection with the early hatching of chickens by means of both hens and artificial means. The experience so far gained fully warrants the farmers in desiring some other means, than hens, by which to secure May chickens of uniform age and in paying quantity.

SOME POINTS IN FAVOUR OF SECOND METHOD.

In connection with the second method experience has shown that as soon as the snow is off the ground, and the hens have had a run out, that their eggs hatch satisfactorily. Unless the farmer has a brooding-house, which permits of his being independent of outside temperature, he will have to content himself with incubator and outside brooder. After the hens have had a run out, for some little time, the eggs are saved, the incubator filled, and the chickens hatched in first or second week in May. His outside brooder is placed on the rapidly growing grass, and with proper care and food the young chicks will be found to make famous progress. In this way several farmers in the neighbourhood of Carleton Place, Ont., in May last, raised many hundreds of chickens. A visit to the farm of Mr. Alexander McLean, of Ramsay, near the town named, in the month of July last, showed 161 fine Barred Plymouth Rock chicks, and on the same day to the farm of Mr. Joseph Yuill, in the same locality, 350 fine chicks, also Barred Plymouth Rocks. Results were obtained in both cases by the successful operation of incubators, and outside brooders, by the wives of the farmers named. The chickens in both cases made rapid growth, and in the latter instance were sold at the end of August to a Toronto fattening firm for 11 cents per pound live weight. Both were satisfactory instances of the second method, as outlined above, and recommended to farmers who use artificial means.

COULD THE SAME RESULTS HAVE BEEN SECURED WITH HENS?

It may be said that the same results could have been secured by the use of hens. But experience has shown that it is almost impossible to get a sufficient number of broody hens early enough in the season wherewith to hatch out the number of chicks of the same age, so much desired. By the time a sufficient number of sitters could be secured under ordinary circumstances, the season would be advanced and the chickens unavoidably late. Again, the freedom of the chicks hatched and reared by artificial means, from lice, is a great factor in the rapid progress of the young chicks.

DIFFICULTIES MET WITH IN FIRST METHOD.

In connection with the first alternative, viz., the hatching of chicks from eggs laid by hens before the latter have had a run outside, the following experience has been gained :—For three seasons past an incubator of medium capacity was filled at end of March with eggs obtained from hens, the majority of which had laid well during the winter season previous. The fowls were also in comparatively limited quarters and had been gently stimulated to lay. From the period of going into winter quarters—beginning of December until the snow went off the ground—it was impossible for them to run outside. The results obtained were most unsatisfactory, and the conclusion was arrived at that machines, condition of stock, methods, or men, or a combination. were at fault.

During the three seasons that observation was made of the eggs while hatching, and subsequently of those which did not hatch, results unmistakably showed :

1. A fairly satisfactory number of fertile eggs.

2. A large percentage of dead chicks in different stages of development from 10th to 18th days.

3. A number of fully developed chickens dead in the shell about pipping time.

4. That it was not so hard to get the fertilized egg, as the strong germs so necessary to hatch the robust chickens.

SIMILAR EXPERIENCE ELSEWHERE.

So important was it considered to ascertain the cause, or causes of the unsatisfactory results enumerated and to find a remedy therefor, if possible, that leave was asked for and obtained for the purpose of visiting the experts in charge of some of the large Canadian plants. A visit was first paid to the poultry department of the Ontario Agricultural College at Guelph, and the subject was thoroughly discussed with the manager of that department, Mr. W. R. Graham. His establishment embraced an incubator room, and commodious brooder-house of the most approved plans. His opportunity for investigation and observation was therefore exceptionally good. His experience was that early January eggs gave 50 per cent of results, but that later eggs were most unsatisfactory, and were so until the breeding stock had run outside. He had taken steps to investigate the matter. His opinion was that the long confinement and continuous laying of the hens during their winter confinement, with lack of exercise, were predisposing causes.

Mr. Graham considered the matter of such importance that he accompanied me to the poultry department of the Massey Farm, East Toronto, and to the large poultry establishment of the Toronto Poultry and Garden Produce Company, at Eglington, North Toronto.

With these managers, views were exchanged, and the subject thoroughly discussed from its different standpoints.

The experience of these managers was similar to that of Mr. Graham, and my own, viz., that eggs from hens which had been confined to limited quarters, during winter, and were stimulated to lay during that period, had not given good results. The general opinion was that eggs laid by hens, properly mated, at the beginning of the season, late November or early December, would likely give better results than those laid at the end of the season. This opinion seems also to be that of the managers of the large broiler establishments of the Eastern States of America, who announce that with the view of securing a larger percentage of chickens than heretofore, that operations will commence this year in November, a month earlier than usual.

COMPARISON BETWEEN HEN AND INCUBATOR.

In order to make comparison between hens and incubators as hatching mediums, during the early season of the past two years, a number of eggs were put under the hens at the same time that others collected under the same conditions were placed in an incubator. The eggs were examined from time to time. The difference in the phases of progress were detected and finally the same percentage of fertile eggs were hatched. When the embryo was not robust enough to make progress, it died under hen as well as in incubator. This showed that the opinion entertained by some persons that eggs will hatch under a hen when they will not do so in an incubator, was not borne out by results in these trials.

CONCLUSIONS ARRIVED AT.

While scientific investigation into this important branch of poultry development will inevitably take time, observation and experimental work so far has shown :—

1. That early spring eggs from hens which have laid steadily all winter and have been gently stimulated to do so, are not likely to produce a satisfactory percentage of strong germs.

2. That eggs from the same hens after they have run outside give much better results.

3. That the condition of the laying stock at end of winter seems to be the source of trouble.

4. That investigation so far has not made clear the exact cause or causes of that condition.

INVESTIGATION COMMENCED.

Already scientific investigation in connection with the subject has commenced. In a bulletin issued by the Rhode Island (U.S.) Experiment Station, last spring, it is stated 'that in very many cases the loss of newly-hatched incubator chicks has been the sole obstacle to success.' And one of the principal causes is attributed to 'inherited constitutional weakness.' And which may also be said to be the cause of so many chicks dying in the shell, near the hatching period. The foregoing conclusions seem to point to a faulty condition of the breeding stock, and to justify our own conclusions in that respect.

In our poultry department steps have been taken to ascertain whether the eggs of December will give stronger germs and more of them than those of early March, when the vitality of the laying stock is presumably less. With this object in view, two pens of eleven two-year old hens, and two of pullets, have been mated up. When sufficient eggs have been collected they will be placed in an incubator and results noted.

BREEDING PENS MADE UP.

On January 15 the following breeding pens were made up :—

Breeds.	Cocks.	Cockerels.	Hens.	Pullets.
Barred Plymouth Rocks	1	..	8	..
White Plymouth Rocks	1	..	7	..
Langshans	1	..	7	..
White Wyandottes	1	..	10	..
White Leghorns	1	..	8	..
Black Minorcas	..	1	8	..
Brown Leghorns	1	..	8	..
White Minorcas	1	..	5	..
White Indian Game	1	..	..	4

Crosses.

Light Brahma, male, mated with.......... 4 Barred P. Rock hens.
Barred P. Rock, male, mated with .... 8 W. Leghorn pullets.

MANAGEMENT OF THE SITTERS.

When the hens became broody, they were set in wooden boxes placed in vacant pens of No. 2 house. The pens were 7 x 9 feet in size, and no more than four sitters were allotted to a pen. The wooden nest boxes contained no bottoms, and had a hinged door in front The nests were made of dry lawn clippings, which were found to answer the purpose much better than the cut straw used in previous years. Grain, grit and drink-water were constantly before the sitters. On being made, the nests were thoroughly dusted with a disinfecting powder, and so were the sitters, before being put on the nests. If the sitters are not so dusted at time of sitting, and during the hatching period of twenty-one days following, they are apt to become infested with vermin. It was found beneficial to place two or three china eggs in the nests as arranged and allow the broody hens to sit on them, for a day or two The sitters having proved reliable, the china eggs were removed and replaced by the valuable ones. In the case of borrowed sitters this will be found a wise precaution, as will also the thorough ridding of the birds of any vermin that might be on them. In the morning the doors of the nest boxes, which had been closed from the previous day, were opened and the sitters allowed opportunity to get out for food, water and a short run. In early spring, when the weather is likely to be cold, the sitter should return to her nest inside of ten minutes. Some space is given to the foregoing details because they are all important in the successful hatching of chickens by hens. Where incubators and brooders are used they do not, of course, apply. (*See* cut of nest box.)

The following list shows the number of eggs set under hens and result in chickens:

EGGS SET AND CHICKENS HATCHED.

When Set.	Description of Eggs.	When Hatched.	No. of Chicks.
April 7.	6 B. P. Rocks, 7 W. P. Rocks	April 28..	2
" 20.	13 W. Wyandotte (from A. G. Goodacre, N.S.)	May 11..	11
" 20	13 " " "	" 11..	11
May 2.	13 White Indian Games	" 23..	10
" 2..	13 " "	" 23..	6
" 3.	13 B. P. Rocks	" 24..	10
" 3.	13 Langshans	" 24..	7
" 3.	13 "	" 24..	8
" 3.	13 Buff Leghorns	" 24..	8
" 4.	13 "	" 25..	6
" 5.	13 Silver Laced Wyandottes	" 26..	11
" 10.	13 Andalusians (from Guelph, Ont.)	" 31..	8
" 10.	13 " "	" 31..	8
" 14.	13 " (from Rigaud, Que)	June 4.	6
" 14.	7 Andalusians, 6 W. Minorca	" 4..	6
" 19.	6 P. Rock—Brahma cross, 6 P. Rock—Leghorn	" 9..	5
" 19..	16 B. P. Rocks (from Guelph, Ont)	" 9..	5
" 19..	14 " "	" 9..	5
" 28..	13 B. Minorca (from Maxwell, Ont.)	" 18..	3
" 30	13 W. P. Rocks (from Guelph, Ont	" 20..	4
" 30.	13 Andalusians "	" 20..	9
	257 About 20 settings, average result about 58 per cent.	....	149
	Hatched by incubators	....	235
	Total	....	384

It will be noticed in the foregoing list that of twenty-six eggs from Grand Pré, N.S., twenty-two chickens hatched. Such results from eggs which had come so far were highly satisfactory and were indisputable evidence of strong germs, the result of robust breeding stock. Some of the later and smaller hatches were due to eggs more or less shaken up in transit or to clumsy sitters. The eggs from Nova Scotia were carefully and skilfully packed in a small box with egg compartments. Past experience, in obtaining eggs from a distance, has shown that the principal factors in obtaining satisfactory results are :

1.—Robust breeding stock, which give the strong germs.

2.—Fresh eggs.

3.—Careful selection and packing.

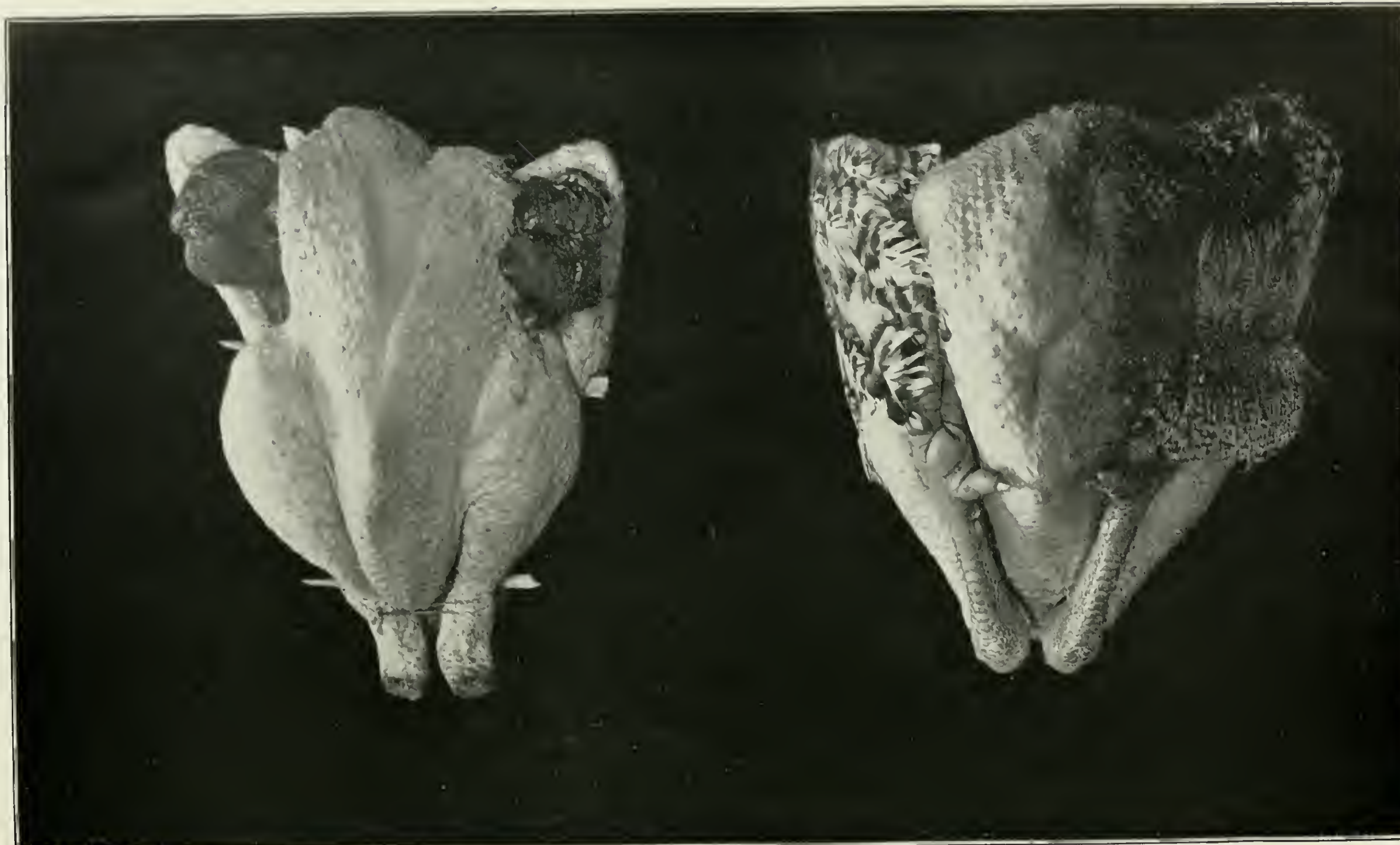
4.—Careful handling *en route*.

5.—Purchasing from experienced breeders.

On the part of the purchaser, care in hatching the eggs by natural or artificial means is also necessary. The responsibility does not altogether rest with the breeder who sells the eggs.

CARE AND GROWTH OF THE CHICKENS.

As in former years the late April and May hen-hatched chickens did the best. Experience has proved that the farmer who uses the natural means will get best results by having his chickens out in the first two weeks of May. In a previous page it has been shown where the wives of farmers have used incubators and brooders with great success in so doing. In the poultry department the chickens hatched by hens and incubators made satisfactory progress. In the case of the hen-hatched chickens the



Light Brahma and Plymouth Rock cross dressed for the home market. Seven months old, weight of the pair when killed, 8 lbs. 6 oz.

latter were permitted to remain in their nest for twenty-four or thirty-six hours, when with the mother hen they were placed in a slatted coop on the grass outside. The coop was so arranged that it could be securely closed at night while ventilation was secured. Through the slats the chicks could run on the grass outside, while the hen remained inside. On the floor of the coop was sand to the depth of two inches. On taking the mother hen from her nest she was given food and water. She had been probably thirty-six hours on the nest bringing out her chickens and deserved the attention. Apart from this she would be more likely to brood the chicks contentedly, after being fed, than if hungry or thirsty. How important it is to have early chicks carefully brooded is well known to all experienced breeders. The rations and treatment of former years were adopted, viz., stale bread crumbs followed by stale bread soaked in milk and squeezed dry. This for a day or two, when granulated oatmeal was given. Crushed corn was not given until after eight days, and whole wheat was not fed until twelfth or fourteenth day. As the chicks grew, a mash composed of shorts, cornmeal, stale bred and a small quantity of prepared meat was mixed with boiling skim milk, allowed to cool and was given three or four times per day. Occasionally small potatoes were boiled and mixed into the mash. Milk and water were both furnished for drink.

The incubator-hatched chickens were allowed to remain in the nursery of the machines for twenty-four or thirty-six hours when they were put in the brooders outside. The chicks were fed the same rations as those outlined above.

WEIGHTS OF CHICKENS.

On the above rations the chickens made the following development :—

No. 6—	B. Rock	cockerel,	hatched	April 28,	weighed	August 11,	3 lbs. 8 oz.—	September 11,	5 lbs. $3\frac{1}{2}$ oz.
74—	W. Wy	"	"	May 11	"	" 11,	3 " 10 "	" 11,	5 " 6 "
78	"	"	"	" 11	"	" 11,	3 " 3 "	" 11,	4 " 10 "
68	"	"	"	" 11	"	" 11,	2 " 15 "	" 11,	4 " 5 "
59	"	"	"	" 11	"	" 11,	2 " 14 "	" 11.	4 " 6 "
49	"	"	"	" 11	"	" 11,	3 " 1 "	" 11,	4 " 4 "
3—	B. Rock	"	"	" 11	"	" 11,	3 " 1 "	" 11,	4 " 14 "
73	"	"	"	" 24	"	" 11,	2 " 13 "	" 11,	4 " 11 "
5	"	"	"	" 24	"	" 11,	2 " 15 "	" 11,	4 " 4 "
52	"	"	"	" 24	"	" 11,	2 " 10 "	" 11,	4 " 3 "
	"	"	"	June 9	"	" 11		" 11,	3 " 10 "
	"	"	"	" 9	"	" 11		" 11,	3 " 8 "
	"	"	"	" 9	"	" 11		" 11,	3 " 10 "

A cross of Light Brahma, male, and Barred Plymouth Rock, female, produced fine, large, hardy birds, which grew rapidly and made flesh quickly. It was one of the best crosses tried in our department.

Three cockerels of the above cross hatched by incubator on June 9 and 16 weighed when killed on December 18, 8 pounds 6 ounces, 8 pounds 5 ounces, and 6 pounds 8 ounces, respectively. The plate on frontispiece shows the appearance the birds presented when dressed for market.

EGGS LAID BY DIFFERENT BREEDS IN SIX AND A HALF MONTHS.

Breeds.	From December.	January.	February.	March.	April.	May.	June.	Up to 6th July when hens ran outside.	Totals.
12 B. P. Rock hens	18	44	38	83	95	36	32	12	358
10 " pullets	24	57	75	112	90	75	60	14	507
8 White Leghorn hens	18	34	33	66	119	106	127	25	528
8 " pullets	56	127	116	97	104	51	103	9	663
8 Black Minorca hens	37	79	91	124	113	109	120	16	680
9 " pullets	30	116	140	119	119	87	97	4	712
3 Andalusian hens	15	42	26	38	25	37	26	7	216
8 Langshan hens	36	125	104	95	136	125	71	12	704
10 W. P. R. hens	29	67	83	84	68	33	34	8	406
9 " pullets	19	32	35	54	59	46	87	4	336
10 White Wyandotte hens	26	66	70	81	55	42	6	5	351
9 " pullets	6	83	105	71	47	32	41	......	385
6 Coloured Dorking hens	30	41	41	57	......	Sold.	....	......	169
6 Buff Leghorn hens	37	54	49	54	83	57	95	11	440
12 Mixed hens	79	92	82	106	71	73	89	10	602
9 " pullets	......	56	71	67	67	68	79	8	416
8 Brown Leghorn hens	65	110	103	123	123	109	133	10	776
9 " pullets	74	125	111	124	94	97	102	19	746
5 White Minorca hens	29	32	47	39	50	40	44	5	286
8 " pullets	28	45	54	41	60	27	40	5	30C
4 White Indian Game	......	14	73	58	61	29	39	5	279
12 P. R. W. Leg. cross	2	75	136	92	112	95	110	13	635
	658	1,516	1,683	1,785	1,751	1,365	1,535	202	10,495

The hens named in above table were under two years of age.

WHEN THE PULLETS COMMENCED TO LAY.

Barred P. Pullet (hatched May 24)................	December 6
White " (hatched May 26)..........	" 4
Buff Leghorn Pullet (hatched June 16)..........	" 2
Langshan Pullet (hatched May 24)....	" 24
White Wyandotte Pullet (hatched May 11)..	" 24

WHEN WINTER LAYING COMMENCED.

The winter season was unusually early and the snowfall of the middle of November compelled the closing in of the laying stock at that period. The birds were in good health and condition with the exception of the Langshan and White Plymouth Rock hens, several of which had not completely got over their moult. The first hens to lay were Barred and White Plymouth Rocks, Brown and White Leghorns, and Black Minorcas. Winter laying commenced 18th November.

NUMBER OF EGGS LAID DURING YEAR.

December, 1899	658
January, 1900	1,516
February	1,683
March	1,785
April	1,751
May	1,365
June	1,535
July	1,089
August	661
September	438
October	221
November	176
	12,878

PRICE OF EGGS DURING YEAR.

The price of new laid eggs during the year was unusually good, particularly so during the summer months. In the midsummer months the average price per dozen was 15 cents. In the fall months from 18 to 25 cents were the prevailing figures on the market. In many instances private parties sold at the latter price much earlier in the season.

STOCK ON HAND.

On December 8, 1900, the following old and young stock were on hand :—

	Cocks.	Cockerels.	Hens.	Pullets
Barred P. Rocks	2	..	13	29
White "	1	..	9	7
Langshans	1	7	10	10
Coloured Dorkings	..	..	2	..
White Wyandottes	1	1	4	12
White Leghorns	1	..	10	..
Brown "	1	..	15	..
Buff "	1	2	6	11
Black Minorcas	..	..	12	5
White "	1	..	6	..
Andalusians	..	3	3	6
Indian Games	..	3	4	4
Crosses	..	..	12	12
	9	16	106	96

DISEASES OF POULTRY.

Inquiries as to poultry ailments have not been as numerous in recent, as in previous years, no doubt the result of better methods of care and treatment. The symptoms of the comparatively few cases described during the past year pointed to liver derangement of some sort, no doubt the result of overfeeding hens of older age than they should have been allowed to attain.

Germ Diseases.—In all cases of germ diseases the best and simplest treatment was advised, as well as the separation of the ailing birds from the well ones, and the thorough disinfection of the premises, after recovery. Indeed, as a precautionary measure, it is well to thoroughly disinfect the fowl-house once or twice every year.

Lice.—In several instances a remedy for lice-infected fowls and premises was asked for and given. In the case of fowls in limited number—one of the many forms of carbolic powder was recommended. When in large numbers one of the liquid preparations was advised as the most speedy way in which to meet the difficulty. These liquid lice-destroying preparations have, in recent years, been put upon the market and are said to be efficient. For red mites the remedy published in report of last year was advised, as follows :—A solution of

Corrosive sublimate	4 ounces
Common salt	4 "

Dissolve in two to four quarts of water. When completely dissolved dilute to 25 gallons.

With this carefully spray every crevice, nook and corner of the house, first removing and burning all movable wood parts.

As the solution is highly poisonous, care should be observed in handling it.

Follow by whitewashing the premises. Before returning the fowls to the poultry-house see that they are entirely free from vermin.

EXPERIMENTS IN THE PRESERVATION OF EGGS.

The following interesting results of experiments in the preservation of eggs by Mr. F. T. Shutt, Chemist to the Experimental Farms, is a continuation of the work begun by him three years ago. Full details of investigation, up to that period, are given in the report of the Poultry Department of last year, beginning at page 223. The results, as given in last year's report, have been widely copied and are yet the subject of much inquiry.

OTTAWA, December 29, 1900.

(The Preservation of Eggs by Frank T. Shutt, M.A.)

In the report for 1899 (page 223 *et seq.*) will be found a record of the results obtained, in two series of the experiments with certain solutions as egg preservatives. The preservatives employed were saturated lime-water, lime-water plus 10 per cent of common salt, 10 per cent solution of water glass (sodium silicate), 5 per cent glycerine, and distilled water. The coating of the eggs with paraffin was also tried. After a careful examination of the eggs, including poaching, we concluded that saturated lime-water gave by far the best results.

During the past year we have repeated several of the above mentioned trials and also tested the efficacy of certain other methods for egg preservation that have received attention from time to time in the press. The experiment was begun on June 5, and the eggs examined on December 10.

Three eggs from each experiment were poached.

Briefly stated, our results are as follows :—

A.—Eggs immersed continuously in saturated lime-water. Outward appearance, excellent ; yolks, non-adherent, of good colour and fairly globular ; albumin, somewhat more limpid than in fresh eggs, and slightly discoloured ; a very slight 'stale' odour ; air space, normal ; poached eggs free from all objectionable taste and of good appearance.

B.—Eggs first smeared with vaseline and immersed continuously in lime-water. Externally, somewhat darker than the foregoing and rather greasy ; yolk, globular and of good colour ; albumin, a very faint yellowish tint and somewhat limpid ; a very slight 'stale' odour ; air space, normal ; poached egg very similar to that in 'A.'

C.—Eggs continuously immersed in 2 per cent silicate of soda. External appearance good and very similar to that of eggs in lime-water ; yolk, globular and of good colour ; albumin, but very slightly discoloured, almost normal ; marked odour of a 'soapy' character which is further developed in poaching; air space, normal ; poached egg, of very good appearance, but with faint 'stale' flavour.

D.—Eggs continuously immersed in solution of 5 per cent of gum arabic and 1 per cent formalin. Outward appearance, inferior to those in foregoing tests ; yolks, attached to shell ; albumin, decidedly discoloured ; odour, not marked ; air space, normal ; appearance of broken egg much inferior to those in preceding test ; developing marked flavour on poaching.

E.—Eggs continuously immersed in 5 per cent gum arabic plus 5 per cent salicylic acid. Preservative solution quite mouldy and with a very bad smell. Egg-shells quite soft. The broken egg, though not unsightly, had a most nauseating odour and was quite unfit for food.

F.—Eggs continuously immersed in 5 per cent dextrin plus 5 per cent salicylic acid. Preservative solution very mouldy and smelling badly. Egg-shells soft, and contents unfit for food.

G. Eggs dipped momentarily in dilute sulphuric acid, then washed and stored in a large bottle. All exceedingly bad ; contents very offensive.

H.—Eggs dipped momentarily in sulphuric acid, washed and dipped in alkaline ammonium oxalate, then stored in large bottle. All the eggs very bad and contents offensive.

These experiments corroborate many of the results obtained last year, and give further proof of the excellence of the eggs preserved in saturated lime-water. We think that, on the whole, 2 per cent sodium silicate gives better results than the 10 per cent solution experimented with last year, but we are also of the opinion that lime-water is superior to both as an egg preservative. Moreover, it is cheaper and pleasanter to handle.

GENERAL INFORMATION

ON POINTS IN POULTRY KEEPING ASKED FOR BY NUMEROUS FARMER CORRESPONDENTS AND OTHERS.

Notwithstanding the large amount of information that has been distributed throughout the country, in relation to poultry-keeping in all its different phases by our experimental farm reports, during the past twelve years, there is yet a very great demand for further information on the subject. Poultry keeping by farmers and others is evidently making rapid development, hence the demand.

It is of primary importance that beginners should understand that successful poultry keeping is dependent upon the following conditions :—

A knowledge of the business.

A suitable house.

The proper breeds.

Proper number of fowls.

Suitable food and treatment.

Fowls of proper age.

Care and proper treatment of chicks from time of hatching.

A KNOWLEDGE OF THE BUSINESS.

In the world of commerce a knowledge of the business engaged in is considered necessary to success. Poultry keeping for profit is no exception to this rule. Letters are frequently received from correspondents to the following effect, 'that the writer has been engaged in the dry goods, or other business, in the prosecution of which he has lost his health. Being of the opinion that poultry keeping will be a means of restoring his health and making a livelihood, he desires to know quantity of land, quantity of grain to be grown, number of fowls, &c., necessary for success.' It is evident that the undertaking in the case of such a correspondent would be that of a specialist, which is the most advanced branch of poultry keeping. To ensure success, capital, a large plant and expert knowledge would be necessary. Such expert knowledge could be learned by attending one of the agricultural colleges, where a course of poultry keeping is taught, or by serving an apprenticeship at one of the large poultry plants. The knowledge might certainly be gained by experience, which would necessarily be lengthy and costly.

THE POSITION OF THE FARMER.

The position of the farmer is entirely different. It is essentially his business. He has already a certain knowledge of live stock, in the majority of cases of poultry keeping. His stock may not be thoroughbreds, his poultry house not of the latest or best pattern. But these are obstacles which can quickly and cheaply be removed. He has the grain, the green food and other essentials in abundance, in many cases almost in the shape of waste. To him the information contained in this and other experimental farm reports, is of the greatest value, because it can be, as it has already been in many instances, so easily converted into satisfactory results.

A SUITABLE HOUSE AND CONTENTS.

There is really no cast-iron rule as to the building of a poultry house, for conditions vary so much in different parts of the Dominion. But there are certain guiding rules that should be followed, viz. :—

As much light as possible.
A moderately comfortable temperature, say 40°.
As much room as possible.
The disturbance of the laying stock as little as possible.

The poultry house should face the south, with a window in that part—a double one in very cold regions—so that the sun can shine through it during the winter time. A board floor has been found best, because an earth one, if it becomes damp, which it is likely to do in cold weather, will remain so all winter. Again, unless frequently raked over, the loose top earth removed and renewed, it will probably become foul, and be the source of disease. On the board floor should be litter, composed of straw, oat hulls, cut leaves, &c., and this should be removed and renewed from time to time. The passage-way, if size of house requires one, should be on the north side, and the front of the pens so arranged that the collecting of the eggs, cleaning of the platform, the feeding of the soft food and watering should all be done from the passage-way. This arrangement will much lessen the disturbance of the laying stock. Where it is possible to have a small pen for roosting and laying in, and a larger one, alongside, for a living and scratching room, the laying stock will be still less disturbed. By this plan, when the litter on the floor of one pen is being removed, the fowls can go into the other pen. Birds of the Mediterranean family are particularly sensitive to disturbance. The nests should be dark and secluded. Darkened and secluded nests tend to prevent egg eating, a vice much easier prevented than cured.

A dust bath in the shape of a square box, 5 x 5 feet, larger or smaller, according to the number of hens, is necessary. It should contain dry earth, or earth mixed with fine soft wood, or coal ashes, so that the fowls may dust themselves in it and keep their bodies free from vermin. Other articles requisite are a small box, 8 x 4 inches, to hold grit in one compartment, and oyster shells, or other form of lime, in the other, and a drinking fountain. A narrow trough, 6 or 8 feet in length by 3½ inches in width, is also necessary for the feeding of the cut bone or mash, whether this is done from the passage-way or inside the pen. No less than 6 square feet should be allowed to each fowl. A temperature of 40°is about the correct one. A correspondent in Winnipeg writes that he got best results from a temperature of 40 or 45 degrees. The birds should be divided into colonies of 15, 20 or 25 each. They will be found to give best results in small numbers, with plenty of room.

The poultry building should be kept clean and free from vermin. If disease is discovered among the fowls, the sick ones should at once be removed and the premises thoroughly disinfected. It is a good plan to disinfect and whitewash the house once or twice every year. The roosts should be kept dampened with coal oil. Scaly leg and the lodgment of lice are so prevented. Coal oil should be freely but discreetly used about nests, roosts, platforms, and wherever lice are likely to make lodgment.

THE PROPER BREEDS FOR THE FARMER.

The farmer evidently desires fowls which will give him eggs in winter, and later on rapid flesh-forming chicks. Both results may be secured by means of Plymouth Rocks or Wyandottes. This is not said with prejudice to other breeds. Of the two breeds named, Barred Plymouth Rocks and White Wyandottes are given first choice, not only on account of their good qualities, but because they can be had almost in any locality and at cheap prices. Experimental work, extending over many years, has shown that Barred Plymouth Rock pullets lay as well as any others. With proper care and feeding, from time of hatching, a pair of Barred Plymouth Rock cockerels should weigh, at the end of four months, 8 or 8½ pounds. White Wyandottes have low combs and a blocky flesh-carrying body, and for those reasons make excellent fowls for the farmer. Mr. A. G. Goodacre, of Grand Pré, N.S., writes that his strain of White Wyandotte hens laid eggs, seven of which weighed one pound. As to flesh development, the weights are given, in a previous page, of a number of cockerels hatched from eggs obtained from Mr. Goodacre. The characteristics of both Barred Rocks and White Wyandottes, with those of other standard breeds, are given in a following page.

PROPER NUMBER OF FOWLS.

From 100 to 150 hens should not overtax the resources or energy of the ordinary farmer. If he has help from wife and family, as many have, a greater number may be profitably kept. But it is not desirable, under any circumstance, to have more hens than can receive the care and attention so necessary for success. With judicious management and treatment of his stock, and proper sale of their products in eggs and chickens, each hen should yield a profit of $1 to $1.50 per year, over and above expenses of feed, which to a farmer should not be more than 75 cents per head for the same time.

SUITABLE FOOD AND TREATMENT.

In the preparation of the winter rations, calculated to incite their fowls to egg laying during that season, farmers should find opportunity to utilize much of the waste of their farms. The mash affords a means of doing so, as will be apparent in the following list of rations, which afford liberal range for choice, not only to farmers but to others.

RATION 1.—SUITABLE FOR USE BY FARMERS.

Morning.—Mash of whatever ground grains are in greatest abundance and cheapest, mixed with potatoes, turnips or carrots, boiled. Many of the vegetables named are in the shape of waste, and may be made good use of in this way. Add a small quantity of black pepper and a few pinches of salt, and mix into crumbly condition. Feed three mornings or afternoons of the week. For proportions in which to feed, see Ration 5. The mash may be varied occasionally by mixing in clover hay in lieu of the boiled vegetables. The clover hay should be well steamed before being used. After feeding scatter two or three handsfull of oats in the litter on the floor of the pens to start the hens to exercise in searching for it. Other three mornings of the week feed cut bone or meat in some shape. When mash or cut bone are fed in the afternoon, feed grain in the morning instead.

Noon.—A little more grain to keep hens in exercise.

Afternoon.—This ration should be thrown in the litter on the floor, before it is too dark, and should be fed in such quantity as to send the fowls to roost with a full crop. Wheat is the best grain. Buckwheat is excellent.

RATION 2.

Morning.—Two parts of ground oats, one part shorts, one part cornmeal, and a small quantity of animal meal. The latter should be omitted when cut bone is fed. Mix with hot water into mash and feed three times per week, morning or afternoon. Dust in small quantity of black pepper and salt. Other mornings, cut bone or other form of meat. When mashed or cut bone is fed in the afternoon, grain should be fed instead at morning ration.

RATION 3.

Morning.—Mix into mash, wheat bran, 2 parts; ground oats, 1½ parts; cornmeal, ⅛th part. Season with salt and add half a teaspoonful of black pepper. Feed three times per week. Start hens to exercise.

Noon.—Small quantity of grain to keep fowls searching for it.

Afternoon.—Same as No. 1.

The above ration is recommended for egg production by Mrs. Judy, a well known poultry keeper and writer on poultry subjects.

RATION 4.

The following ration was fed to a pen of White Plymouth Rocks, owned by Dr. W. S. Stevens, of McChanistown, Ohio, and which pen won the prize offered by the National Stockman, three years ago, for the largest yield of eggs per hen during the year. The average number of eggs per hen is given at 289.

Morning.—Equal parts of bran, wheat middlings, chopped corn and oats, with some fine beef meal mixed in and the whole made into mash.

Noon.—Wheat was thrown into the litter on the floor of the scratching shed to keep hens busy.

Evening.—Whole corn.

From April 1 to November 1 the same was fed, except that the morning mash was mixed with cold water and wheat was given instead of corn. The greatest of cleanliness was observed.

It will be noticed in the above that the fowls had access to a scratching shed, which climatic conditions permitted, and by which they received the benefits of change of air and exercise during the winter season.

RATION 5

The following ration and manner of feeding it has been found effective in our poultry department :—

Mash—Shorts	2 parts
Ground oats	1 "
Cornmeal	1 "
Small potatoes boiled	¼ "

The whole mixed with boiling water into a crumbly condition. This was fed in proportion of one quart (Imperial), weighed dry, to 15 hens, three times per week, in morning or afternoon. A little was fed to the pullets every day, but was found at end of January to be fattening the Barred Plymouth Rocks, and the feeding was reduced to three times per week and to the same quantity as fed to the hens. Cut bone in proportion of 1 pound to every 15 hens other mornings, or, afternoons when mash was not fed.

At 11 a.m., steamed lawn clippings were given in moderate quantity and were eaten with great relish. If fed too frequently, or in too great quantity they were found to make the hens crop-bound.

At noon a light feed of oats (5 pounds to every 100 layers) was thrown into the litter on the floors of the pens, to incite the fowls to continued exercise.

For afternoon ration, 8 to 10 pounds of wheat to every 100 hens was thrown into the litter and the fowls seemed to make active search for it.

Mangels were found to be the cheapest and most convenient form of green food, and were before the layers at all times and so were grit and crushed oyster-shells. Pure drink water was in abundance.

PROPER QUANTITIES TO FEED.

This has been found a very difficult matter to decide. Experience has shown that proportions of food that have answered in one case have not done well in another. Again, pullets have done well and given good results on a ration that would certainly have put older hens out of condition. Careful experiment, extending over a period of some years, with rations fed in different quantities, to different lots of hens, is requisite to lead to definite quantities.

Experience in feeding winter rations during past years has shown very clearly the following :—

1.—That variety in the rations and time of feeding are beneficial.

2.—That where there is such variety there are neither egg-eating nor feather-picking.

3.—That pullets will do well on rations, which, if fed in same quantity to old hens of the Asiatic or American breeds, will end fatally.

4.—That sameness in rations and too heavy feeding are likely to cause *enteritis* or inflammation of the intestines. (See report of 1897.)

The method of feeding adopted in our poultry department for some years past, has been with a view of avoiding over-feeding, and the evils resulting from it; simplicity and cheapness of rations, and affording variety which has been found to be the very spice of poultry life. Correspondents have said that amount of mash as advised in reports of 1897 and 1898 was not enough for winter use. Others have said that heat was the chief factor in obtaining the eggs. It is quite possible to have been under rather than over the mark, and it is equally probable that with artificial heat a less quantity of food had been found effective. In a cold poultry house more food would be required to get the same results as had been attained in a moderately warm one. Which goes to show the benefit of a temperature in a poultry building of not lower than 40 degrees, as advised in this and previous reports. And under ordinary climatic conditions, and in a well-conducted house, it might be possible to obtain such a temperature without artificial means.

FOWLS OF PROPER AGE.

Experience has shown that it is not advisable to keep fowls of the heavy breeds over two years of age for the reasons that if kept until older they are apt to moult late and to put on fat easily. In the case of Leghorns, Minorcas, Andalusians and Hamburgs the birds may be kept until three years old. A simple and efficient way of keeping trace of the age of a fowl is to put a ring, made of wire, on one of her legs for each year of her life.

PROPER CARE AND MANAGEMENT OF CHICKENS.

Full particulars as to the proper care and management of sitting hens and of the chicks hatched by them will be found on a preceding page.

FATTENING OF THE CHICKENS.

If the chickens receive the attention and food as outlined, they should be ready to be sold to any of the large establishments which purchase chickens to fatten, and ship to the English market, or the farmer may prefer to dispose of them to special customers in the large cities, or, if he has them in sufficient numbers he may prefer to ship them to the agent of the Department of Agriculture in London, England, Mr. A. W. Grindley, first notifying the Commissioner of Agriculture and Dairying of such intention in order that arrangements may be made for their transmission by cold storage.

Should the farmer desire to specially fatten his chickens before sale, or shipment, his simplest and speediest plan is to put his birds at 3½, 4 or 4½ months of age, in slatted coops or crates divided into compartments to hold one, or a number of birds up to four. These coops should have V-shaped feeding troughs in front. The following fattening ration has been found most effective in our poultry department, viz. :—

Two parts finely ground oats.

One part finely ground barley.

One part ordinarily ground cornmeal.

After 15th day add beef suet in proportion of one ounce to every four birds. Mix with skim-milk. If the milk is made near the boiling point the tallow, which should be chopped fine, will be melted by it when poured on the ground grains. Or the tallow may be melted in the hot milk. The birds should be fed all they will eat twice a day. Carefully collect all uneaten food. Leave none to turn sour, and feed none in that condition.

Care should be taken to free the birds from vermin before cooping. This may be done by rubbing sulphur well into the feathers, or by one of the lice-exterminating powders.

Pens and premises should be kept scrupulously clean.

Grit and water should be supplied regularly. Three weeks should be sufficient to fatten the birds satisfactorily.

METHODS OF FATTENING ADOPTED BY FARMERS.

Several farmers have sent their methods of and foods used in fattening chickens. Some of them are given as follows :—

Mr. A. McPhadden, of Dominionville, Ont., states that his crates are made of common building lath, 4 feet long, divided into two compartments, with the bottom laths planed. Four chicks were put in each compartment.

Rations for first week were composed of 3 parts oats, 1 part pease.

Second week—Same as first, with a little cornmeal added.

Third week—Quantity of cornmeal was increased.

Three weeks' fattening was sufficient.

Cost of one pound flesh production, 5½ cents.

Mr. James Watson, of Sonya, Ont., described the rations used by him as follows :—

Two parts finely ground oats.

One part finely ground barley.

Mixed with skim-milk and fed 3 times per day for 3 weeks.

Thirty B. P. Rock cockerels weighing 167 pounds were put into crates on October 22, and fed on above rations. Gain made in first week, 24 pounds ; second week, 20 pounds ; third week, 12½ pounds. Cost of producing one pound of flesh, 5¼ cents.

Messrs. Armstrong Bros., of Fergus, Ont., describe the following as rations used by them :—

Morning—Two-fifths ground corn ; two-fifths wheat bran ; one-fifth wheat middlings. Fed 3 mornings. Other mornings ground oil cake was mixed into mash. Noon—Boiled potatoes and stale bread. Afternoon—Immediately after noon ration was eaten, the troughs were cleaned and filled with whole corn and wheat. This was allowed to remain before the birds for the rest of the day.

The birds were placed in slatted coops 16 x 20, and in each compartment 3 to 4 were put. Feeding lasted for nineteen days. Average gain, 1½ pounds each. During last week very little soft food was given. Water and grit were regularly supplied. No milk was used.

As showing the good results from careful attention to and proper feeding of the chicks from time of hatching until they were able to eat a mash of ground grains, a lady states that she had four Barred P. Rock cockerels weigh at end of three months respectively, 4 pounds ; 4 pounds ; 4½ pounds. Their soft food was composed of shorts, cornmeal, with the waste of the table and kitchen. No more than 5 pounds of hard grain were given.

THE FORCING METHOD.

Mr. Ernest Cobb, an English writer on poultry subjects, gives the following rules as observed in the large fattening establishments in England :—

When the purchased birds arrived they are placed by themselves in coops, separate from those being forced. They are called 'feeders.'

After being cooped the feeders are allowed no food for twenty-four hours.

After this short fast they are fed from V-shaped troughs—which are suspended in front of their coops—three times per day, all they can eat, of a thin mash, composed of finely ground oats, mixed with half water and half milk.

During the second week the water is gradually replaced by milk.

At end of second week a little fat is melted in the hot milk and mixed in the food.

At end of second week, perhaps a short time before, the birds do not eat as readily as they did and the 'crammer' or forcing machine is called into requisition.

The ration, as used in the 'crammer,' is ground oats and skim milk, sweet or sour, the latter preferred, to which is added fat (tallow in most cases) in proportion of a tablespoonful to each bird.

The mixture as used in the 'crammer' is of the consistency of gruel or thin porridge.

The same authority also says that the 'feeders' should be kept going (by hand-feeding) as long as they continue to put on weight. A bird should never be placed on the 'crammer' so long as it eats heartily. Experience has shown that after ten days or a fortnight most birds will not take enough food voluntarily to make weight. It is then that the forcing machine is brought in requisition.

English fatteners prefer finely-ground oats to any other kind of ground grain. Ground barley has been found too heating. Cornmeal puts on yellow fat and tends to give a tinge of that colour to the skin, which is very objectionable to the English buyer. In the United States a yellow skin is rather preferred , while it seems a matter of indifference to Canadian purchasers.

The birds are not allowed any food for twenty-four hours before being killed ; the object is to have no food in the crop to decompose.

MANNER OF KILLING.

Birds intended for shipment to the English market should be killed by having their necks dislocated. When the bird is properly killed in this way the end of the neck should be two inches away from the head. After killing and during plucking the bird should be so held that its head will hang downwards, thus affording opportunity for the blood to drain towards and coagulate in the neck.

Another manner of killing is by cutting the roof of the mouth, at the base of the brain, lengthways and across, with a narrow-bladed and sharp knife, but birds so killed should only be sold on a local market.

PLUCKING.

Immediately after the neck is broken all sense of feeling ceases, and plucking should at once begin and be carefully done. On no account should the skin be torn or bruised in anyway. Mr. E. Cobb, the English authority already quoted, thus describes the operation : 'The immediate plucking of the bird is advocated because the feathers come away ten times easier directly after killing than if the bird is left alone for one minute only before starting. Many fatters never employ the thumb in plucking, excepting at a few places, and prefer slipping, as it were, one finger under the feathers and catching them as in a vice between the other fingers. Having cleared the neck down to within a couple of inches or so of the head, pluck the sides of the breast and the top of the back level with the wings, then do the wings, and work down the back to the tail, extract the latter, and, turning the bird over, finish up at the point that you left off on the breast, taking the legs on the way down.'

SINGEING.

Many of the English fatters singe their fowls. This should be done immediately after plucking and before the body is cold. It should be carefully done, so as not to burn the flesh. All the 'pin' feathers should also be carefully removed. The bird is now ready to be pressed.

The English practice before putting the bird into the 'press' is to tie the hocks together above the shank. The pressing machine is made by placing a board against a wall at an angle of 65 degrees. Or it may be made in the shape of a stand. In the latter shape it is made by placing two boards together at right angles. The birds are then placed breasts downwards, with sterns pressed against the wall, or slanting board and heads hanging downwards. A weight is placed on the backs of the chickens, so as to press their breast bones in flat, slightly crushing them in without breaking them. In the evidence of the Commissioner of Agriculture and Dairying, before the Agricultural Committee of the House of Commons, the operation is thus described : 'a glazed brick or other weight is laid on top, and another brick is put alongside to keep it in position until the next bird is pressed closely there. After the row is full the chickens are left lying on their breasts with a board laid on top of them, with sufficient weight to hold them firmly and crush the breast bones slightly.'

The birds should be left in the press from two to six hours, at any rate until thoroughly cooled.

PACKING.

For shipment to England, the birds should be neatly packed in lightly made but strong cases or boxes, to hold twelve birds, six in the bottom of the case and six on top of the lower tier. The birds should be wrapped in clean white paper, and arranged so as to present a neat appearance on being unpacked. In packing, the heads of three birds should be at one end of the case and the feet at the other end. The other three birds should be arranged the opposite way, and so that they will neatly fit in.

TURKEYS.

THE BEST BREED FOR THE FARMERS—HOW TO KILL, PLUCK, DRESS AND PACK.

The *Fish Trades' Gazette, Poultry, Game and Provision Chronicle*, of London, England, speaks of Canadian turkeys as 'splendid birds, being equal to, if not superior, to the fine birds from the continent.' The same paper says that the styles of plucking, dressing and packing have much improved, and as a result a large trade in Canadian poultry, not only at Christmas, but at other times, is likely.

To comply with the conditions of the English market, it is of paramount importance that the birds be of the best quality. Next, that they are plucked, dressed and packed according to the best methods.

It is of first importance that our farmers breed the largest, best and hardiest birds. Climatic conditions, in the greater part of Canada, are favourable to the breeding of a large number of turkeys, indeed of all kinds of poultry. There are six varieties of turkeys, viz. :—Bronze, Narragansett, White, Black, Buff and Slate. Of these the Bronze are the largest and heaviest. The standard weights of this variety are :—

Cock.............	36 pounds.	Hen..........	20 pounds.
Cockerel...........	25 "	Pullet .	16 "

The first requisite in successful breeding is strong, vigorous parent stock. Inbreeding should be avoided. It is admissable to use a good male two years, but not so to use a young male and pullets of the same family. Young hens weighing 15 to 18 pounds, and older ones of 18 to 20 pounds weight, are the best layers, and make the best mothers. One male with 10 or 12 hens is a good mating.

Some turkey hens lay more eggs than others. Eighteen to twenty-four eggs from each hen should be satisfactory. The turkey hen makes the best mother, although some breeders give the first seven eggs to a common hen. The objection to the latter is that she is apt to drag the young pullets too much about.

Twenty-five young birds are all that the turkey mother can keep dry and warm.

It is of first importance to keep the young birds in dry quarters. Great care is necessary in rearing them until they 'shoot the red,' (get wattles, &c.). It must be borne in mind that young turkeys before 'shooting the red,' are the most tender of all feathered fowl, and afterwards the hardiest.

Too early setting is not advisable in this latitude. Where the winters are milder and spring earlier it is different.

After hatching, the youngsters and their mother should be put in comfortable, dry quarters. Give a grass run if possible. The coop should be roomy, and so conveniently situated that mother and brood can easily be driven into it, in case of rain. Care should be taken that mother and brood do not get into the grass while wet with the morning dew. It is important to remember this. It is also well to remember that experienced breeders have traced the death of many young birds, in their early handling of them, to damp quarters, lice and indigestion, the latter probably from eating uncooked food. Unclean, carelessly mixed and uncooked food has been the cause of death in the case of many young and tender birds. The mortality among young turkeys, from one end of the country to the other, is far too great and is principally caused by neglect of the points outlined above.

PROPER RATIONS.

For the first few days feed on stale bread soaked in milk and squeezed dry. Mix with hard boiled eggs and onions, both chopped finely. Curd or a sort of cheese made from sour milk may also be given.

Later on feed on granulated oatmeal, rolled oats, or a mash made of stale bread, onion tops, oatmeal, cornmeal or middlings, the whole mixed with skim-milk. The milk should be boiled and a little black pepper dusted into it, before putting it into the mash.

For the first five or six weeks feed four times daily. Afterwards three times.

At the time of 'putting on the red,' uncooked food should not be fed. At this period the young birds are likely to eat ravenously, but on no account should they be allowed to gorge themselves. After becoming fully feathered they require nothing but hard grain.

Turkeys are fond of roaming, and often wander away from headquarters. In this way many are killed by weasels, skunks and other enemies.

A good plan is to feed the hens and their broods grain every evening, and so accustom them to coming home. This, of course, when the young birds have reached the proper age.

TO FATTEN.

Birds may be fattened as in the case of chickens while running outside, or by being penned up and specially fed. Success has attended the fattening of turkeys in many instances, by the forcing method. But with the right breed in the first instance, care and proper food, there should be no difficulty in obtaining the desired flesh development.

KILLING.

The birds intended for shipment to Great Britain are killed in the same manner as chickens, by dislocation of the neck. Care is necessary in having this properly done, as the following note of warning from a London poultry purchasing firm to an Australian agent, shows :—

'Having purchased the several consignements of frozen poultry which you have had on show in the exhibition, I have written you our opinion of same. A, the quality very good ; B, trussing very good; C, packing well done ; D, killing may be capable of being very much improved on, as the necks of the birds are invariably very much discoloured, and appear almost unsaleable through this. I would suggest bleeding at the mouth, and not so much force used in dislocating the neck. I consider there is a good market here for your poultry, if you can send it, say, to arrive in England continuously from January to June.'

It is not likely that bleeding at the mouth will be adopted by those firms who ship in large numbers. But if this manner of killing is adopted, it should be done as advised in the case of chickens killed in that way, viz., by the cutting of the roof of the mouth, at base of the brain, with a narrow sharp knife, lengthways and across. If the roof of the mouth is pierced at the base of the brain, death is said to be instantaneous and painless.

PLUCKING AND DRESSING.

This should be done as outlined in a previous page in the case of chickens. In plucking, which should begin immediately after dislocation of the neck and be very carefully done, feathers should be left on the neck for three inches.

PACKING.

Instructions as to packing issued by the Commissioner of Agriculture and Dairying, are as follows :—

Every bird should be wrapped neatly in paper, the head with a quantity of thick paper to absorb any blood. The birds should be packed with their backs down and heads to one side.

Twelve to twenty-four birds should be packed in a case. The case should be packed quite full, so as to prevent birds knocking about inside, during transit or in cold storage.

The case recommended is six feet long by twenty inches wide, and from seven to eleven inches deep. Top, bottom and sides are made of half-inch lumber, with a strengthening piece in centre, one-half inch thick.

The cocks and hens should be packed in separate cases.

The weights of the birds and their sex should be marked on the left-hand corner of both ends of the case.

A quantity of clean straw or wood pulp should be put on the bottom of the case and on top of contents, with wrapping paper between the birds and packing material, to prevent any possibility of injury.

SHIPPING BIRDS IN FEATHER.

In shipping birds in feather the following directions should be followed :—

Kill birds by cutting in roof of mouth as described in previous page.

Before being packed the birds should be thoroughly cooled. Pack in air-tight barrels.

In packing, the heads of the birds should be on the middle of their backs. The barrels should be marked so as to describe contents.

DUCKS

	Lbs.		Lbs.
Pekin Drake	8	Pekin Duck	7
Young Drake	7	Young Duck	6
Aylesbury Drake	9	Aylesbury Duck	8
Young Drake	9	Young Duck	7
Rouen Drake	9	Rouen Duck	8
Young Drake	8	Young Duck	7

Early in the season three to five ducks are allowed to a drake. Later in the season when running outside, eight or twelve. The drake should not be over two years of age.

Ducks lay from 100 to 140 eggs in a season. The eggs take twenty-eight days to hatch. Duck eggs are hatched by hens or ducks. They hatch well by incubator.

RATIONS.

For first three or four days, mash of cornmeal, a little hard boiled egg chopped fine, ground wheat or oats, or granulated oatmeal, the whole being mixed with boiling milk. The young birds are very fond of cabbage, lettuce or clover, which should be chopped fine and may be mixed in mash. Make mash crumbly. Skim-milk for drink.

Later on a mash may be made of cornmeal, bran and oatmeal, with chopped green stuff, and mixed with skim-milk boiled.

Feed the young ducks five times per day. Keep them in dry quarters, out of the hot sun and supply water in limited quantity in shallow dishes, so as to prevent them ducking into it.

After three or four weeks reduce the rations to four per diem. As the ducklings grow the rations may be added to by house-waste, ground bone, beef scraps or cooked meat. Small pieces of charcoal are aids to digestion.

FATTENING.

To fatten, feed on ground grain, meal, beef scraps, &c., made into a mash. Barley meal is excellent in the soft food. Nothing should be fed that will give the flesh a bad flavour.

In nine weeks the ducklings should weigh four and a half pounds each and are ready for market. They should be marketed before the pin feathers begin to grow, which is likely to occur after ninth week.

KILLING AND PICKING.

Ducks are best killed by cutting into base of brain at roof of the mouth. Before killing the feet of the birds should be caught in a loop with head hanging downwards. Immediately after being killed the picking (dry) should be done. Care should be taken to prevent injury of any kind to the carcass.

GEESE.

The best known breeds of geese, and their weights, are as follows :—

	Lbs.		Lbs.
Toulouse Gander	25	Young Gander	20
Toulouse Goose	23	Young Goose	18
Embden Gander	25	Young Gander	20
Embden Goose	25	Young Goose	18

Mating.—One gander to three females. Mate with large vigorous birds.

Management.—In spring make large comfortable nests. In most cases two clutches of eggs are laid, sometimes three. Collect the eggs soon after being laid, as they are easily chilled.

Hatching.—Some breeders who hatch geese on a large scale use incubators. Mrs. Wolcott, Napoleon, Ohio, in *Ducks and Geese*, published by the *Reliable Poultry Journal*, Quincy, Ill., says : 'I incubate their first laying with chicken hens, and frequently let "old mother goose" care for her second hatch. Be sure to have the hens, chosen for sitters, free from lice. Sprinkle the eggs with warm water twice during the last week. Oftener in dry hot weather will do no harm. Remove each gosling from the nest as it hatches, for they are easily mashed. Keep them in a flannel cloth in a basket in a good warm place until all are hatched.'

Sometimes the goslings have to be helped out of the shells.

RATIONS.

For first three days.—Similar food as that recommended for ducklings, or the following, by Mr. C. L. Darlington, Lloyd, N.Y. : cornmeal mixed with hard-boiled eggs, chopped fine, a pinch of black pepper and a handful of sand. After three days discontinue the eggs, and give bread soaked in skim or sweet milk, oatmeal, or broken rice boiled until soft, outer leaves of cabbage, onion tops, and all the grass they can eat. Keep the young birds from water, but give it to them in liberal quantities to drink.' The same authority recommends as a fattening ration a liberal supply of barley meal and cornmeal, soaked in buttermilk. A grass run is indispensable.

KILLING, PLUCKING AND DRESSING.

For local market, the goslings should be ready in twelve to fourteen weeks, and should be of large size at end of 16 weeks.

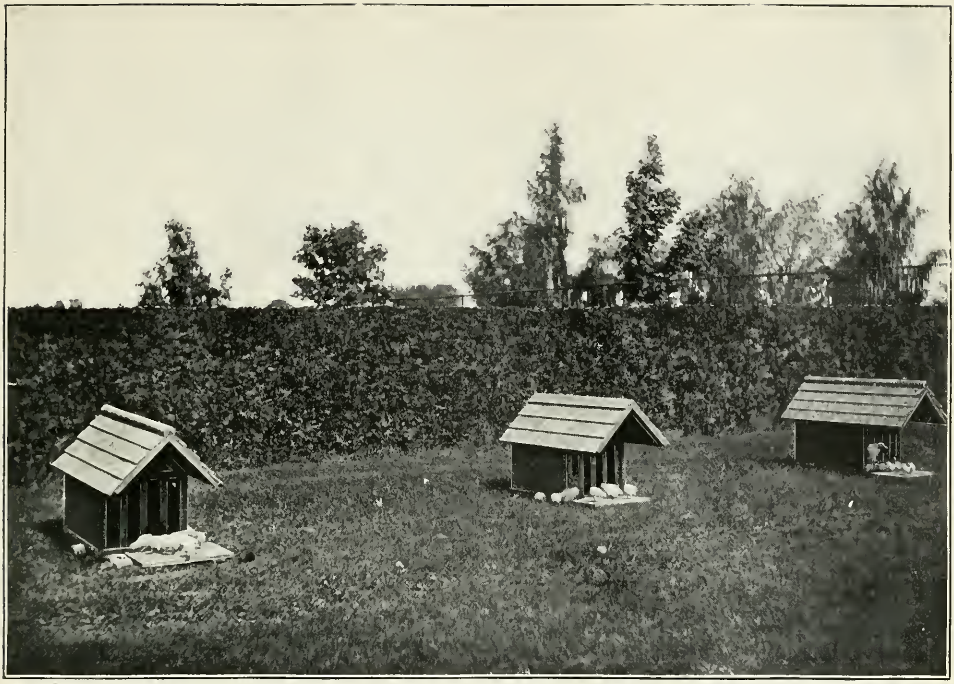
They should be killed by bleeding in the roof of the mouth, and all feathers taken off except on wing tips. For shipment and local market the geese are not drawn.

No birds less than nine pounds each should be shipped to the English market. They should be packed ten in a case.

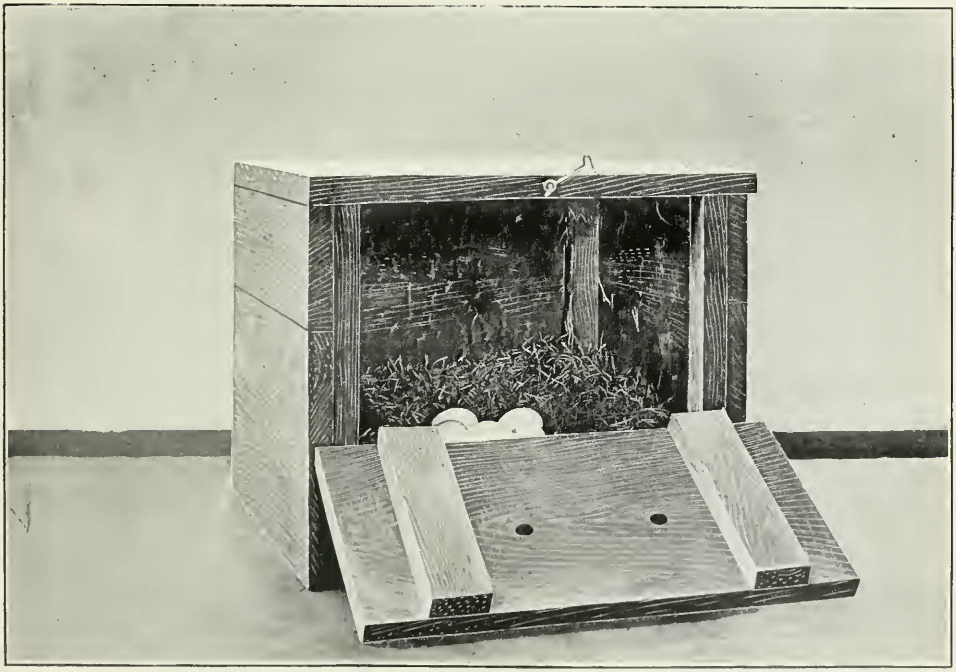
NOTES.

Goose eggs hatch in thirty to thirty-four days.

Some breeders assert that the worth of the feathers from a bird should nearly pay half the cost of its feed for one year.



Hens and chickens in outside coops on grass. Central Experimental Farm, Ottawa.



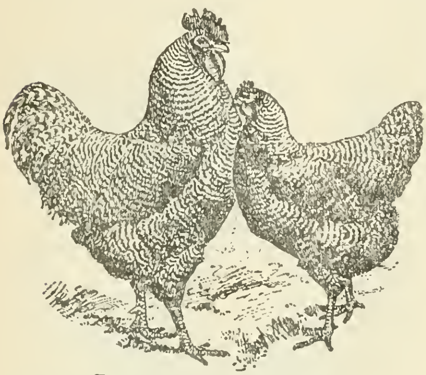
Nest-box for sitting hens. Central Experimental Farm, Ottawa.

STANDARD BREEDS

AND THEIR CHARACTERISTICS. GOOD WINTER LAYERS AND RAPID FLESH FORMERS.

PLYMOUTH ROCKS.

The different varieties of this breed may all be classed as general purpose fowls. The females are good layers and their progeny make rapid flesh formers. The different varieties are described as follows :—



Barred Plymouth Rocks.

Barred Plymouth Rocks.—Natives of America. Thoroughly acclimatised females make good winter layers as pullets and one year old hens. After that age apt to put on fat, unless skilfully handled. Chickens are hardy and make, when properly fed and cared for, flesh development equal to one pound and one and a quarter pounds per month. Standard weights are as follows :—

	Lbs.
Cock	9½
Cockerel	8
Hen	7½
Pullet	6½

Pure bred birds should have yellow beaks, shanks and toes. Bright red face, comb, wattles and earlobes. Eyes clear rich bay. The plumage should be bluish gray and distinctly barred, the barring extending on the feathers to near the skin. It is permissible with the females sometimes to have a slight dark stripe down the beak.

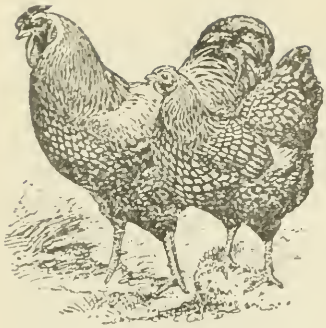
White Plymouth Rocks.—An excellent variety of the same breed. Some strains are more robust than others. Weight and points same as the Barred, except plumage, which should be pure white.

Buff Plymouth Rocks.—A comparatively new variety, but one which has rapidly come to the front on its merits. Weights and points same as others, except plumage, which should be an even shade of golden buff.

Buff Plymouth Rock.

WYANDOTTES.

Of the Wyandotte family there are the sliver-laced, white, golden, buff and black varieties. Not many of the last named are met with. The other varieties are very popular and deservedly so. They are of American origin and acclimatised.



Silver Laced Wyandottes.

Silver Laced Wyandottes.—The first and oldest variety and one possessing much merit as a layer and market fowl, as well as beauty of plumage. The hens make good winter layers, good sitters and good mothers. The chickens are hardy and make quick growth. Of late Silver Laced Wyandottes have not been so numerous as in previous years, perhaps owing to the favour with which the newer and equally good varieties have been received. Standard weight same as white variety. Colour of eggs, light brown.

White Wyandottes.—A typical fowl for the farmer, being blocky, broad in breast, with meaty body and having a low rose comb. Hens are excellent winter layers. Chickens are hardy and make flesh development equal to that of the Barred Plymouth Rock. Great favourites with broiler raisers.

Standard weights are :

	Lbs.
Cock	$8\frac{1}{2}$
Cockerel	$7\frac{1}{2}$
Hen	$6\frac{1}{2}$
Pullet	$5\frac{1}{2}$

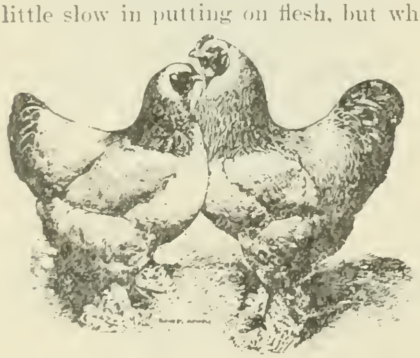
Distinguishing points are : Yellow beak, shanks and toes. Bright red comb, face, wattles and earlobes. Plumage and quills, pure white. Colour of egg, light brown.

White Wyandotte.

Buff Wyandottes.—A new-comer and very popular. Not in such numbers yet as the whites or silver-laced. Their characteristics are very much the same as the other varieties. Standard weights the same.

ASIATICS.

The Asiatic family is composed of Light and Dark Brahmas, Buff, Partridge, White and Black Cochins and Black and White Langshans. They are of ancient origin and great favourites with fanciers and poultry breeders. They are hardy and heavily feathered. As compared with Plymouth Rocks and Wyandottes they are a little slow in putting on flesh, but when full grown make large and heavy birds.



Light Brahmas.

Light Brahmas.—A great favourite and deservedly so. The hens are layers of brown coloured eggs. Chicks are hardy and make steady growth. Hens are too heavy for early sitters, when shells of eggs are apt to be thin. They are the heaviest of the Asiatic breeds.

Standard weights are :

	Lbs.
Cock	12
Cockerel	10
Hen	$9\frac{1}{2}$
Pullet	8

In the thoroughbreds the following points are called for : Bright red face, comb, wattles, and earlobes ; yellow shanks and toes, and beak yellow with dark stripe down the upper mandible.

Dark Brahmas are not so numerous or well-known as the light variety. Their characteristics are much the same. The standard weights are slightly different, viz. :—

	Lbs.		Lbs.
Cocks	11	Hens	8½
Cockerels	9	Pullets	7

Buff, White, Black and Partridge Cochins.—All are well-known, the Buffs being the most numerous and best liked. They are hardy and vigorous. Hens are average layers of dark brown eggs of rich colour. Chicks are hardy and fairly rapid growers. The male of the black variety is 10½ pounds weight, half a pound lighter than the other males of that family. The standard weights are :—

	Lbs.		Lbs.
Cocks	11	Hens	8½
Cockerels	9	Pullets	7


Black Langshans.

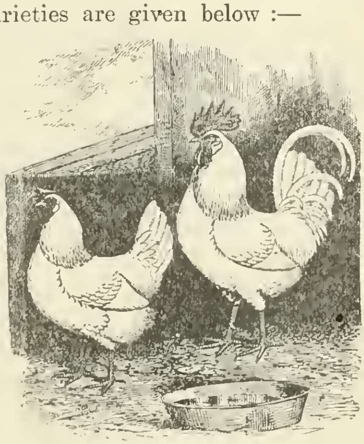
Black and White Langshans.—Of the two varieties the former are much the best known. The Black is an old and well established variety in England, where it has many friends. The females are good layers of an egg of medium size and rich brown colour. The fowls attain large size when properly handled. The chicks are hardy and grow well, but do not make as early market chicks as do the Plymouth Rocks and Wyandottes. Standard weights are :—

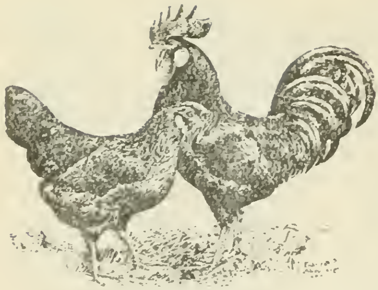
	Lbs.
Cocks	10
Cockerels	8
Hens	7
Pullets	6

MEDITERRANEAN CLASS.

The Mediterranean class embraces the Leghorns, Andalusians and Minorcas, all non-sitters. The different points of the several varieties are given below :—

White Leghorns.—One of the best known and most popular breeds. They are veritable egg machines, as indeed are all varieties of the Leghorn family. The females of this variety are hardy and make good winter layers, when fairly well housed. Chickens are hardy and grow rapidly, the young cockerels crowing at eight weeks' of age. There are no standard weights for the varieties of this class. Eggs are white in colour. Some strains lay large white eggs. Of late the size of the White Leghorns has been increased by skilful mating. They are good fowls for farmers, when kept with a breed of sitters.


White Leghorns.



Brown Leghorns.

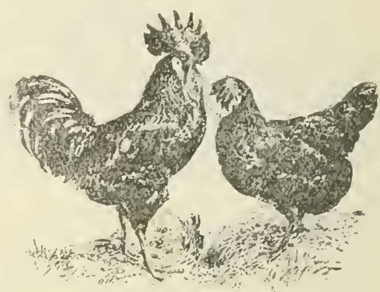
Brown Leghorns.—Another popular variety with an host of admirers. They possess all the merits of the white variety, but their eggs are slightly smaller. Colour of egg, white. Chickens, hardy and rapid growers.

Buff Leghorns.—A comparatively new, but very popular variety. They have taken a foremost position solely on their merits. The eggs of the hens are large and white in colour. Chickens are quick growers.

Black and Silver Duckwing Leghorns.—The latter is a new comer, and has yet to make friends. Neither are as popular as the other and better known varieties.

Black Minorcas.—A well-known and much appreciated breed. They have taken the place of the Black Spanish, because larger and hardier. The hens lay many large white eggs. Many of their eggs go 6 to one pound, and most of them 7 to a pound. They are good winter layers in a moderately comfortable temperature, such a temperature as all winter layers should be kept in. The chickens are hardy and make vigorous growth. Colour of eggs, white. The standard gives the Minorcas' weight as follows :—

	Lbs.
Cock	8
Cockerel	6½
Hen	6½
Pullet	5½

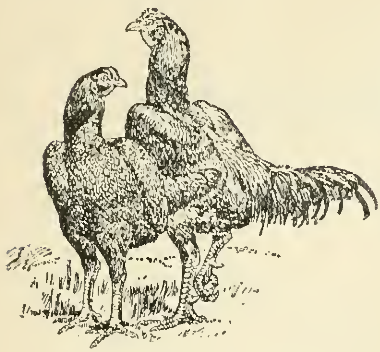


Black Minorcas.

White Minorcas.—Not nearly in such numbers as the black variety. Characteristics much the same. Eggs large and white. Excellent layers. Weights as given above.

Andalusians.—Sometimes known as blue Spanish. A well-known and popular member of the Spanish family. A prolific layer of large white eggs. They have proved themselves good winter layers, when properly fed and cared for. They are hardy. Chickens are strong and make vigorous growth. The standard weights are :—

	Lbs.		Lbs.
Cock	6½	Hen	5½
Cockerel	5½	Pullet	4½


Cornish Indian Games.

Indian Games.—This breed of Games is divided into 'Cornish' and 'White' varieties: They are popular in England on account of their value as market fowls, and for the same reason are finding favour on this side of the Atlantic. They are extensively used in England, and in many instances in this country for crossing purposes. The hens are fairly good layers of an egg of medium size. Chickens are fairly hardy and make satisfactory development. The standard weights are:—

	Lbs.
Cock	9
Cockerel	7½
Hen	6½
Pullet	5½

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF R. ROBERTSON, SUPERINTENDENT.

NAPPAN, N.S., November 30, 1900.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my second annual report, it being the thirteenth annual report of operations on the Experimental Farm for the Maritime Provinces at Nappan, N.S.

The season was on the whole rather wet, but not unfavourable, and fairly good crops were produced, particularly in the case of roots.

The system of rotation of crops, instituted last year, with the cultivated land at present available, which is divided into four parts, with a view of carrying on a four year rotation with manure, on one crop in each four years, and clover with as many of the other crops as possible, was again continued. The rotation practised is : 1st year, grain or sod ; 2nd year, roots with manure ; 3rd year, grain ; 4th year, clover.

As a result of this and the feeding of a greatly increased number of cattle, a very marked increase in the fertility of the farm generally is noticeable.

More stabling accommodation being necessary, a new horse-stable 66 x 30 feet was built at the south-east corner of the main barn. The former horse-stable of same size being converted into a cattle-stable and sheep-house, fitted up with box-stalls.

The cow-stable under the main barn, has also been renovated and repaired by putting a concrete floor over the whole stable, and refitting the cattle-stands and box-stalls.

A root-house, with straw barn above, was also constructed, at the north end of the main barn, 21 x 32 feet, and 10 feet high, which affords room for about 5,000 bushels.

A marked increase is noticeable in the general interest taken in agricultural and live stock matters during the past year.

During the year I have attended and addressed meetings at the following places :—

December 2—Collingwood, N.S.
" 5—Nappan, N.S.
" 27 and 30—Truro, N.S.
January 10—Elgin, N.B.
" 11—Havelock, N.B.
" 12—Jeffrey's Corner, N.B.
" 13—Sussex, N.B.
" 15—St. John, N.B.
" 18—New Glasgow, N.S.
February 5—Yarmouth, N.S.
" 6—Canning, N.S.
" 8—Shubenacadie, N.S.
" 28 and March 1 and 2—Fredericton, N.B.
March 21—Memramcook, N.B.
April 17—Hopewell, N.S.
July 11—Jacksonville, N.B.
" 11—Woodstock, N.B.
" 13—Fredericton, N.B.
" 14—St. John, N.B.
" 15—Sussex, N.B.
" 25—Truro, N.S.
" 26—Sidney, N.S.
" 28—Antigonish, N.S.
" 30—Charlottetown, P.E.I.
" 31—Kensington, P.E.I.
August 30—Wallace Bay, N.S.
November 22—Amherst, N.S.
" 23—Nappan, N.S.
" 28—Charlottetown, P.E.I

I also attended the fat stock show at Guelph, Ont., December 10 and 11.

At least the usual number of people visited the farm both as pic-nic parties and singly, the Pictou County Farmers' Association pic-nic, on August 16, being the largest gathering of the season, with many from adjoining districts, numbering some 1,200 people.

It affords me much pleasure to again state that Mr. Thos. Coates, foreman, and Mr. R. Donaldson, herdsman, have performed their work in a satisfactory manner. their assistance having been of great value to me in keeping records of uniform test plots, and of experiments with stock.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

WEATHER.

The winter of 1899 and 1900 was an exceptionally mild and open one, with very little snow. The thermometer registered below zero only four times : January 18, 7° below ; February 3, 6° below ; Febuary 17, 3° below, and February 27, 7° below.

December came in quite mild, with practically no frost in the ground. On the 2nd, cold weather followed, coming in mild again about the middle of the month. The remainder of December was broken, with very little snow until the last of the month, which made the first sleighing.

January opened with a snow storm on the 1st, followed by cold weather, which continued, with one exception, until the 10th, when wet weather set in and continued until the 12th. The snow was pretty well all off in places at this date, making travelling difficult. Snow, however, began to fall on the 13th. The weather continued irregular, with occasional snow falls, until the 19th, when a thaw commenced and all the snow went off. It continued mild to the 27th, then again freezing up. Slight snow fell during the next few days, but all disappeared once more, having had another rain on the 29th.

Cold weather kept on until February 5, when it moderated, and continued open until the 15th. A low temperature remained until the 23rd, when rain fell, taking off the snow that fell on the 19th, which had made three days of good sleighing. Mild weather continued until the 27th, when cold set in, keeping up until March 1.

March started moderate, with snow, followed by rain, and cold again on the 4th, which continued, with one exception, until the 9th, when mild weather and rain again followed. The 12th was cold, and the 14th was moderate, with rain, hail and snow falling in succession, and freezing up. Sleighing continued good from this date until the 17th, when a heavy warm wind took the snow all off. The remainder of the month continued moderate, with not enough snow for sleighing.

April commenced with a snow storm and wind, followed by fine mild weather. On the 7th a heavy snow storm, with wind, made it necessary to break out the roads. Sleighing was good for a few days. The remainder of April was exceptionally fine, with an occasional rain storm, but no very cold weather.

The first week in May was wet and cold The balance of May, until the 24th, was backward and broken weather, consequently seeding was late. The first seeding was done May 17, but no more again until the 26th. The season continued quite fine after May 24, and June and July were favourable to growing crops.

July was not unusually warm, but a good even temperature was maintained throughout the month. The thermometer registered 81° on the 8th ; 82° on the 9th ; 81° on the 12th, and 82°, 84° and 81° on the 23rd, 24th and 25th respectively. The rain fall during July and August, although not excessive, was continuous, except during the latter part of August, making the haying season quite unfavourable.

August continued a good even month, with no exceptionally warm days, except on the 26th and 27th, when the temperature was 83° and 84° respectively.

The first part of September was fine, but broken and wet after the middle of the month, making the harvest season backward. October was exceptionally wet, rain falling almost continuously throughout the month. This made the season for gathering the root crop very backward. The weather was mild, however, and no frost was registered until October 18, when 4° of frost were recorded. On the 20th, 9° of frost were registered, which did considerable damage to the mangel crop.

November was fairly fine with an occasional frost, and some quite heavy rain. Ploughing continued with one exception until the 25th, when the ground froze up. Snow fell on the 20th and 25th, followed by rain.

METEOROLOGICAL RECORDS.

Maximum and minimum thermometrical observations for the year beginning with December 1, 1899, and ending November 30, 1900.

Month.	Maximum.	Minimum.
1899.		
December	13th, 54° above zero.	8th & 10th, 9° above zero.
1900.		
January	20th, 42° "	18th, 7° below zero.
February	5th, 43° "	27th. 7° "
March	20th, 46° "	6th, 0° "
April	22nd, 65° "	1st and 6th, 20° above zero.
May	30th, 79° "	28th, 29° "
June	25th, 77° "	4th, 31° "
July	24th, 84° "	29th, 40° "
August	27th, 84° "	13th & 24th, 42° "
September	3rd, 81° "	29th, 32° "
October	8th, 72° "	20th, 23° "
November	9th, 62° "	18th, 15° "

EXPERIMENTS WITH OATS.

The uniform test plots of oats were on land of a sandy loam character. The previous crop having been turnips was manured with thirty one-horse cart loads of stable manure, and complete fertilizer at the rate of 200 pounds per acre. The land was ploughed after the root crop was removed in the fall of 1899, and worked up the following spring by going over it twice with the spring-tooth harrow and once with the smoothing harrow.

The grain was sown on this seed bed, at the rate of 2½ bushels per acre, with the Wisner seed drill, and complete fertilizer, i.e., containing nitrogen, potash and phosphoric acid, at the rate of 100 pounds per acre was sown with the seed by means of a fertilizer attachment to the seeder. The field was seeded down to timothy and clover at the rate of 3 pounds alsike, 7 pounds mammoth red clover and 12 pounds timothy seed per acre. This seed was sown with an attachment to the seeder at the same time the grain was sown.

The oat plots were one-fortieth acre each, sown May 17, and sixty varieties were included in the test. The crop of straw was good and stood up well, with the exception of Oderbruch, Flying Scotchman and Golden Beauty, which were badly lodged. The straw was free from rust. Smut was noted in some varieties, but the injury this caused was slight. The results obtained are given in the following table :—

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
1	Black Beauty	Aug. 25	100	40	Medium	7	Branching	5,200	95	10	36
2	Golden Beauty	" 30	105	43	"	7	"	4,200	94	4	34
3	Wallis	" 30	105	40	Stiff	7	"	5,000	92	32	38
4	Holstein Prolific	" 29	104	42	Medium	8	"	4,000	91	26	39
5	Joanette	" 25	100	38	Stiff	7	"	5,080	91	26	38
6	Danish Island	" 23	98	43	Medium	7	"	5,200	90	20	37
7	Buckbee's Illinois	" 28	103	40	"	7	"	4,600	90	20	39
8	Lincoln	" 31	106	44	"	8	"	5,200	89	14	36½
9	Black Mesdag	" 17	92	42	Stiff	9	"	6,000	88	8	38
10	Wide Awake	" 30	105	46	"	7½	"	6,200	88	8	39
11	Bonanza	" 27	102	42	Medium	7	"	4,600	88	8	38
12	Bavarian	" 28	103	42	Stiff	7	"	4,600	87	2	36
13	Cromwell	Sept. 10	116	42	"	8	Sided	6,000	87	2	35
14	Kendal	Aug. 29	104	43	"	7	"	5,600	87	2	38
15	Early Maine	" 30	105	40	Medium	7	Branching	3,800	85	30	36
16	California Pro., Blk. Imp.	" 28	103	42	Stiff	7½	Sided	4,600	85	30	38
17	Early Blossom	" 27	102	44	"	8	"	5,200	85	30	38
18	Thousand Dollar	" 27	102	43	"	7	Branching	4,200	84	24	42
19	Golden Giant	" 30	105	40	"	7	"	3,600	84	24	36
20	Newmarket	" 30	105	43	Medium	7	"	3,800	83	18	39
21	White Schonen	" 25	100	38	Stiff	7	"	4,600	82	12	37
22	Rosedale	" 28	103	42	"	7	Sided	5,000	80	..	39
23	Improved American	" 28	103	40	"	7	Branching	4,400	80	..	37
24	Early Golden Prolific	" 28	103	45	Medium	7	"	4,660	80	..	39
25	Improved Ligowo, Imp.	" 27	102	42	Stiff	7	"	4,600	77	22	39
26	Cream Egyptian	" 23	98	44	"	10	Sided	3,800	76	16	40
27	Early Archangel	" 23	98	40	"	8	Branching	4,600	76	16	40
28	Brandon	" 28	103	42	Medium	8	"	4,200	76	16	41
29	California Prolific, Black	" 28	103	43	Stiff	7½	Sided	4,600	76	16	40
30	Hazlett's Seizure	" 30	105	42	Medium	8	Branching	3,400	76	16	41
31	White Russian	" 27	102	44	Stiff	7	"	4,000	75	10	39
32	Flying Scotchman	" 29	104	42	Weak	7	"	4,400	75	10	41
33	Oderbruch	" 28	103	46	Medium	7½	Sided	5,200	75	10	38
34	Improved Ligowo	" 27	102	42	Stiff	7	Branching	3,800	74	4	39½
35	Banner	" 25	100	42	"	7	"	4,200	74	4	39
36	Salines	Sept. 3	109	43	"	8	"	4,800	74	4	36
37	Mennonite	Aug. 30	105	38	Medium	7	"	3,200	74	4	38
38	Sensation	" 24	99	40	Stiff	7	"	3,400	72	32	39
39	Pense	" 29	104	42	"	8	Sided	4,480	72	32	38
40	Black Tartarian, Imp	" 27	102	37	"	7	"	3,800	70	20	37
41	American Beauty	" 27	102	41	"	6	Branching	3,800	70	20	39
42	American Triumph	" 28	103	46	"	9	"	5,280	70	20	39
43	Siberian O. A. C.	" 28	103	39	"	7	"	4,800	70	20	38
44	Master	" 30	105	40	Medium	7	"	4,200	70	20	38
45	Early Gothland	" 24	99	42	Stiff	7	Sided	4,600	69	18	41
46	Abyssinia	" 27	102	42	"	7	"	4,800	69	18	41
47	Abundance	" 27	102	42	"	7	Branching	3,400	68	8	38
48	Salzer's Big 4	" 28	103	40	"	6	"	3,800	68	8	37
49	Milford	" 30	105	42	"	7	Sided	3,800	68	8	39
50	Holland	" 25	100	44	Medium	8	Branching	4,680	68	8	38

OATS—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
51	Golden Tartarian	Sept. 10	116	48	Stiff	8	Sided	5,200	68	8	34
52	Black Tartarian	Aug. 27	102	38	"	7	"	4,600	67	2	38
53	Olive	" 30	105	46	"	8	"	3,200	67	2	38
54	New Zealand	Sept. 10	116	41	Medium	8	"	5,600	67	2	36
55	Russell	" 4	110	45	Stiff	8	Branching	4,400	63	18	37½
56	Columbus	Aug. 30	105	42	Medium	7	"	3,200	62	12	36
57	King	" 28	103	46	"	7½	"	3,400	62	12	37
58	Oxford	Sept. 4	110	44	Stiff	8	"	2,680	62	12	39
59	White Giant	" 10	116	44	"	8	Sided	4,080	62	12	35½
60	Miller	Aug. 29	104	47	Medium	8	Branching	3,480	60	..	35

EXPERIMENTS TO PREVENT SMUT IN OATS.

Experiments were again conducted this year to determine the value of Formalin and Massel powder as preventives of smut in oats. A sample of very smutty grain was used and treated in six different ways. A check plot was also sown which received no treatment whatever. The seed was sown June 14, and the grain cut September 15. The plot was 33 by 3 feet. The table below gives the number of heads free from smut and the number affected :

OATS TREATED FOR SMUT.

Name of Variety.	How Treated.	Materials Used.	Good Heads.	Smutty Heads.
Flying Scotchman	Soaked, 1 hour	Formalin 4½ oz. to 10 galls. water	3,450	None.
" "	" 15 minutes	" " "	2,610	None.
" "	" 5 "	" " "	2,736	90
" "	Sprinkled	" " "	2,520	None.
" "	"	Formalin 9 oz. to 10 galls. water	2,640	None.
" "	"	Massel powder	2,484	186
" "	Check	Not treated	2,112	432

EXPERIMENTS WITH BARLEY.

The soil of these plots was a clay loam. The previous crop was mangels, having received 30 one-horse cartloads of stable manure per acre with bone meal, fertilizer, and salt at the rate of 200 pounds each per acre. The land was ploughed after this crop was removed in the fall of 1899, and in the following spring worked up by going over it twice with the spring-tooth and once with the smoothing harrow.

The grain was sown at the rate of 2 bushels per acre. The land was seeded down to timothy and clover at the rate of 3 pounds Alsike, 7 pounds Mammoth Red Clover and 12 pounds Timothy seed per acre. Complete fertilizer at the rate of 100 pounds per acre was also sown with the grain.

The crop of straw was good, and with the exception of French Chevalier and Kinver Chevalier, stood up well. The straw was free from rust. Some plots had smut in them, but in every instance the injury from this cause was slight.

The seed was sown May 30, on one-fortieth acre plots. There were twenty-nine varieties of six-rowed, and nineteen of two-rowed sorts in this test. The variety Hulless White started with very weak growth and failed to be worth harvesting.

BARLEY, SIX ROWED—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per acre.		Weight per Bushel.
				Inches.		Inches.	Lbs.	Bus.	Lbs.	Lbs.
1	Mensury	Aug. 30	92	40	Medium	2½	6,000	60	..	48
2	Trooper	" 25	87	38	Stiff	2½	5,200	57	24	48½
3	Albert	" 25	87	42	Medium	3	5,600	57	24	47
4	Royal	" 24	86	32	"	2½	5,200	56	32	47
5	Surprise	" 31	93	33	Stiff	2	4,600	54	80	49
6	Yale	" 30	92	36	"	2½	4,000	53	16	47
7	Common	" 25	87	40	Medium	2¼	4,400	53	16	48
8	Rennie's Improved	" 25	87	41	Stiff	2½	3,800	52	24	49
9	Petschora	" 24	86	40	Medium	2½	3,000	52	24	47
10	Phœnix	" 25	87	40	Stiff	2½	4,000	52	24	47
11	Odessa	" 25	87	38	Medium	2½	4,600	51	32	48
12	Mansfield	" 31	93	38	"	2½	4,200	50	..	47
13	Champion	" 24	86	44	"	2½	5,200	50	40	45
14	Baxter	" 25	87	40	Stiff	2½	3,800	47	24	48
15	Stella	" 31	93	33	"	2	4,200	47	24	48
16	Pioneer	" 24	86	32	"	2½	4,000	45	40	49
17	Garfield	" 30	92	37	"	2½	3,800	43	16	48
18	Oderbruch	" 25	87	36	Medium	2½	3,000	42	24	47½
19	Excelsior	" 25	87	42	Stiff	3	3,600	40	..	40
20	Vanguard	" 25	87	37	"	2½	2,800	40	..	47
21	Summit	" 31	93	33	"	2	3,880	40	..	48½
22	Argyle	" 27	89	40	"	3	2,680	40	..	47
23	Nugent	" 30	92	34	"	2¼	4,280	40	..	48½
24	Empire	" 31	93	34	Medium	3	2,920	36	32	48
25	Success	" 24	86	35	"	2½	3,200	33	16	42
26	Brome	" 31	93	32	"	2½	2,600	32	40	48
27	Claude	" 31	93	30	"	2	2,600	29	8	47½
28	Blue Long Head	" 31	93	30	"	2½	2,600	25	..	42
29	Hulless Black	" 25	87	30	Weak	2	2,200	20	40	60

BARLEY, TWO-ROWED—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per acre.		Weight per Bushel.
1	Beaver	Aug. 30	92	36	Medium	3	5,800	65		51
2	Danish Chevalier	" 31	93	34	Weak	3	4,800	63	16	50½
3	Canadian Thorpe	" 31	93	40	Stiff	3	5,400	58	16	49
4	French Chevalier	Sept. 1	94	40	Medium	3½	4,680	55		51
5	Thanet	Aug. 31	93	38	Stiff	2½	4,600	55		50
6	Bolton	" 30	92	36	Medium	4	4,200	50		51
7	Newton	" 31	93	34	Stiff	2½	3,080	47	24	50
8	Prize Prolific	Sept. 1	94	38	Medium	4	4,600	46	32	50½
9	Clifford	Aug. 31	93	38	"	3	4,600	45		49
10	Dunham	Sept. 1	94	40	Stiff	3	4,000	44	8	49
11	Sidney	" 1	94	40	"	3	4,000	42	24	49½
12	Harvey	" 1	94	40	"	3	3,280	40	40	48
13	Kinver Chevalier	" 1	94	40	Medium	4	3,600	40		48½
14	Nepean	Aug. 30	92	38	Stiff	3	4,600	40		49½
15	Logan	" 31	93	40	Medium	3	3,600	39	8	48½
16	Fulton	Sept. 1	94	38	Stiff	2½	3,600	32	24	48
17	Victor	" 1	94	38	"	3	2,600	28	16	50
18	Jarvis	" 1	94	38	"	2½	3,480	25	40	49
19	Lesne	Aug. 31	93	38	"	2½	2,680	25		50

EXPERIMENTS TO PREVENT SMUT IN BARLEY.

To determine the value of Formalin and Massel powder, as preventives of smut in barley, grain of two varieties was again treated this year in six different ways. A check plot untreated was also sown. The size of each plot was 33 by 3 feet. The grain was sown June 14, and harvested September 15. The number of smutty heads and those free from smut in each plot is given in the following table :—

Barley Treated for Smut.

Name of Variety.	How Treated.	Material used.	Good Heads.	Smutty Heads.
Canadian Thorpe, 2-rowed	Soaked, 1 hour.....	Formalin 4½ oz. to 10 galls. water.	3,726	0
" " .	" 15 minutes..	" " "	3,672	6
" " .	" 5 " ..	" " " .	3,108	12
" " .	Sprinkled..........	" " " .	3,738	48
" " .	"	" 9 oz. to 10 galls. water.	4,272	6
" " .	"	Massel powder..........	4,770	72
" " .	Check	Not treated.......................	4,812	390
Odessa, 6-rowed	Soaked, 1 hour......	Formalin 4½ oz. to 10 galls. water.	3,378	72
" "	" 15 minutes..	" " " .	3,702	114
" "	" 5 " ..	" " " .	3,120	6
" "	Sprinkled...........	" " " .	3,672	126
" "	"	" 9 oz. to 10 galls. water.	4,860	114
" "	"	Massel powder..................	2,618	132
" "	Check	Not treated.	3,972	84

EXPERIMENTS WITH SPRING WHEAT.

Fifty varieties of wheat were sown on May 26, in plots of one-fortieth of an acre each. The soil was a clay loam. The previous crop was mangels, having received thirty one-horse cartloads of stable manure per acre, and complete fertilizer, bone meal, and salt, at the rate of 200 pounds each per acre. The land was ploughed in the fall of 1899. after the crop was removed, and in the following spring was worked up by going over it twice with the spring-tooth and once with the smoothing harrow.

The land was seeded down when sowing the barley to clover and timothy, at the rate of 3 pounds Alsike, 7 pounds Mammoth Red Clover, and 12 pounds Timothy seed per acre. Complete fertilizer, at the rate of 100 pounds per acre, was sown with the grain.

The straw was stiff, and some rust was noted. The seed was sown at the rate of 1¾ bushels per acre :—

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	lbs.	Lbs.	
1	Laurel	Sept. 8.	105	43	Medium	3	Beardless.	5,000	44	40	58½	Slightly.
2	Speltz	" 8.	105	34	"	2	Bearded	4,280	44	40	40	"
3	White Connell	" 8.	105	42	Stiff	3	Beardless.	5,600	44	..	60	"
4	White Fife	" 10.	107	42	"	3	"	5,400	42	.	59	"
5	Hungarian	" 7.	104	39	Medium	2½	Bearded	5,000	41	20	59	"
6	Red Fern	" 6.	103	44	Stiff	2½	"	5,000	40	40	60	"
7	Weldon	" 8.	105	44	"	3	Beardless.	4,800	40	40	60	"
8	White Russian	" 10.	107	43	"	3½	"	5,200	40	40	60	Very slig'tly
9	Red Swedish	" 8.	105	45	Medium	3	Bearded	5,200	40	40	59½	Slightly.
10	Colorado	" 6.	103	44	Stiff	3	Beardless.	4,600	40	.	61½	"
11	Rio Grande	" 7.	104	45	"	3	"	5,000	40	..	59	"
12	Pringle's Champlain	" 7.	104	44	Medium	3	Bearded	5,000	38	40	60½	"
13	Preston	" 6.	103	42	Stiff	3	"	4,200	38	40	61	"
14	Norval	" 5.	102	38	Medium	2½	"	3,000	38	..	60	"
15	Alpha	" 8.	105	44	Stiff	3	"	5,000	38	..	59	"
16	Percy	" 7.	104	45	"	3	Beardless.	5,080	37	20	60	"
17	Clyde	" 8.	105	43	"	3	"	4,480	37	20	59	"
18	Roumanian	" 7	104	43	"	2¼	Bearded	4,200	36	40	60	"
19	Dion's	" 8.	105	44	"	3½	"	4,000	36	40	60	Very slig'tly
20	Advance	" 7.	104	44	"	3	"	4,600	36	40	60	Slightly.
21	Red Fife	" 8.	105	42	"	3½	Beardless.	5,080	36	40	59	"
22	Monarch	" 8.	105	42	"	3	"	4,400	36	40	59	"
23	Beaudry	" 8.	105	40	Weak	2½	Bearded	3,200	36	..	60	"
24	Plumper	" 5.	102	41	Medium	2½	"	4,600	36	..	61	"
25	Mason	" 8.	105	40	Stiff	2½	Beardless.	3,600	35	20	59	"
26	Ladoga	" 1.	98	46	Medium	2½	Bearded	4,400	35	20	60½	"
27	Campbell's Wh'e Chaff	" 8.	105	40	Stiff	3	Beardless.	4,000	34	40	59	"
28	Dawn	" 6.	103	45	"	3	"	4,800	34	..	60	"
29	Huron	" 8.	105	40	"	2½	Bearded	3,400	34		60	"
30	Goose	" 6.	103	38	Medium	2½	"	3,400	34	.	61½	"
31	Blair	" 8.	105	40	"	2½	Beardless.	2,600	34	.	60	Medium.
32	Wellman's Fife	" 10.	107	46	Stiff	3¼	"	5,000	34	.	59	Very slig'tly
33	Dufferin	" 3.	100	40	Medium	2½	Bearded	3,080	33	20	60	Slightly.
34	Vernon	" 4.	101	43	Stiff	3	"	4,000	33	20	60	"
35	Stanley	" 5.	102	42	"	3	Beardless.	3,600	33	20	60	"
36	Progress	" 8.	105	40	Medium	2½	"	3,000	33	20	59½	Badly.
37	Herisson Bearded	" 8.	105	37	Weak	2	Bearded	3,200	33	20	59	"
38	Admiral	" 7.	104	45	Stiff	3	Beardless	4,600	33	20	58	Slightly
39	Beauty	" 8.	105	40	Medium	3	"	3,600	31	20	58	"
40	Blenheim	" 8.	105	42	Stiff	3	Bearded	3,600	31	20	59	"
41	Captor	" 8	105	42	"	3	Beardless.	3,400	28	.	58	"
42	Crawford	" 5.	102	40	Medium	3	"	3,000	28	..	61	Badly.
43	Byron	" 5.	102	36	"	3	Bearded	3,400	28	..	61	Slightly.
44	Early Riga	" 1.	98	46	"	2½	Beardless.	3,600	28	.	59	"
45	Crown	" 8.	105	42	Stiff	3	Bearded	3,400	27	20	59	"
46	Harold	" 8.	105	38	Medium	2½	"	3,200	24	40	60	Badly.
47	Rideau	" 4.	101	38	"	2½	Beardless.	3,400	24	..	58	"
48	Ebert	" 8.	105	40	"	2½	"	3,400	24	.	57	"
49	Fraser	" 4.	101	38	"	2½	Bearded	3,200	22	..	60	Slightly.
50	Countess	" 8	105	38	"	2½	Beardless	3,200	20	10	58	"

EXPERIMENTS WITH PEASE.

The plots of pease were on sandy loam. The previous crop having been turnips, was manured with thirty one-horse cartloads of manure, and complete fertilizer, at the rate of 200 pounds per acre. The land was ploughed after the root crop was removed in the fall of 1899, and the following spring worked up by going over it twice with the spring-tooth, and once with the smoothing harrow.

The seed was sown May 28, in one-fortieth acre plots. Complete fertilizer, at the rate of 100 pounds per acre, was drilled in with the seed. Timothy and clover, at the rate of 7 pounds Mammoth Red, 3 pounds Alsike Clover, and 12 pounds of Timothy seed per acre, was also sown.

The growth gave evidence of being a fine crop, but, as was the case last year, the crop was greatly damaged by the pea aphis *Nectarophora destructor*, which infested the crop about the first of August. After the middle of August, without any known cause, this pest seemed to greatly lessen, and the damage was not as great as that reported last year.

Fifty-eight varieties were grown. The variety called Grass Pea failed to ripen any seed, and consequently is not included in the table which gives the results obtained from these tests :—

PEASE—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Character of Growth.	Lenght of Straw.	Weight of Straw Per acre.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
						In.	Lbs.	In.		Bus.	Lbs.	Lbs.
1	Crown	Sept.	6	101	Strong	41	3,600	2	Small	29	20	60½
2	Nelson	"	6	101	Medium	40	3,000	2½	Medium	28	40	60
3	Oddfellow	"	5	100	Weak	36	3,400	1½	"	26	40	63
4	Elephant Blue	"	7	102	"	34	2,800	2	Small	26	40	60
5	Perth	"	6	101	Medium	40	3,000	2½	Large	24	40	61
6	Centennial	"	5	100	"	36	2,800	2	Small	23	20	60
7	Chancellor	"	7	102	"	35	2,600	2	"	22	40	61
8	French Canner	"	7	102	Strong	40	3,000	2	"	22	40	60
9	Elliot	"	11	106	"	42	3,200	3	Large	22	40	61
10	Black Eyed Marrowfat	"	7	102	"	44	2,600	2½	"	22	40	60
11	Mummy	"	5	100	Medium	36	3,000	2	Small	22	..	62
12	Multiplier	"	7	102	Strong	40	2,600	2	"	22	..	61
13	Agnes	"	6	101	"	42	2,800	2	Medium	22	..	59
14	English Grey	"	8	103	Medium	40	2,600	2	"	21	20	60
15	Alma	"	6	101	Strong	42	2,800	2	"	21	20	60
16	Carleton	"	7	102	"	42	2,600	3	Small	21	20	61
17	Archer	"	7	102	Medium	40	3,400	2	"	21	20	60½
18	Arthur	"	5	100	"	35	1,800	2	Medium	20	40	62
19	White Wonder	"	5	100	"	36	2,080	2	"	20	40	60
20	Daniel O'Rourke	"	7	102	Strong	44	3,080	2	"	20	40	60
21	Eureka	"	7	102	Medium	36	3,600	2¼	"	20	40	61½
22	New Potter	"	6	101	Strong	44	3,600	2½	"	20	..	60½
23	Cooper	"	6	101	Medium	40	2,600	2½	"	19	20	60
24	Paragon	"	11	106	"	36	3,000	2½	"	18	40	60
25	Pride	"	6	101	Strong	42	3,000	2½	"	18	40	61
26	Harrison's Glory	"	6	101	Weak	35	2,000	2	Small	18	..	62
27	German White	"	6	101	Medium	34	1,600	2½	Large	18	..	60
28	Lanark	"	6	101	Weak	33	1,800	2½	Medium	18	..	60
29	Picton	"	6	101	Strong	40	2,200	2	"	18	..	60
30	Mackay	"	10	105	"	44	2,400	3	Large	17	20	60
31	Duke	"	11	106	"	44	3,000	2	Medium	17	20	60
32	Bedford	"	11	106	"	42	2,400	2¼	"	17	20	60
33	Bright	"	6	101	"	40	1,880	2¼	Large	16	40	62
34	Early Britain	"	5	100	Medium	36	1,400	2	"	16	..	59
35	King	"	7	102	"	34	2,000	2	Medium	16	..	61
36	Creeper	"	7	102	Strong	40	3,000	2	Small	15	20	59
37	Trilby	"	10	105	"	42	2,600	2½	Medium	15	20	61
38	Canadian Beauty	"	7	102	Medium	38	1,400	2	"	15	20	62
39	Vincent	"	6	101	"	34	1,800	2½	"	15	20	62
40	Elder	"	10	105	"	36	2,600	2	Small	15	20	59
41	Prince	"	6	101	Weak	33	1,400	2¼	Medium	14	..	61½
42	Golden Vine	"	6	101	Medium	36	1,800	2	Small	13	20	61
43	Kent	"	6	101	"	36	2,000	2½	Medium	13	20	61
44	Bruce	"	10	105	Strong	44	2,200	2	"	13	20	60
45	Fenton	"	7	102	"	40	2,000	2½	"	13	20	60
46	Wisconsin Blue	"	6	101	Weak	30	1,800	2	Small	12	40	61
47	Prince Albert	"	6	101	Strong	42	1,600	2	"	12	..	60
48	Dover	"	7	102	"	46	3,000	2½	Large	12	..	60½
49	Macoun	"	10	105	"	42	1,400	2½	Medium	12	..	61
50	Chelsea	"	7	102	Medium	36	1,800	2	Small	11	20	60
51	Prussian Blue	"	6	101	"	36	1,800	2	"	10	..	62
52	Gregory	"	6	101	Weak	34	1,800	2	"	10	..	61
53	Harold	"	6	101	Medium	36	1,680	2	"	10	..	60
54	Fergus	"	8	103	"	36	1,400	2	"	10	..	60
55	Large White Marrowfat	"	6	101	Strong	40	1,400	2½	Large	10	..	61
56	Pearl	"	11	106	"	46	1,800	2½	Medium	10	..	58
57	Victoria	"	7	102	"	44	1,400	2¼	"	6	40	61

EXPERIMENTS WITH FIELD GRAIN.

In order to determine the relative yield of mixed grain as compared with single varieties, plots of one acre each were laid out on a field of as uniform a character as possible. This land was a light loam, of poor quality, the only manure used for many years being a crop of peas ploughed under green in 1899. This crop was ploughed under in September as green manure. The land was again ploughed late in the fall to a uniform depth of 6 inches.

This was worked up in the spring with the disc, spring-tooth and smoothing harrows, each going over it once. Complete fertilizer at the rate of 100 pounds per acre was drilled in with the grain. One acre of mixed grain was also sown without fertilizer to determine the increased yield from the small quantity of fertilizer used.

Five acres of land similar in character, and having had similar treatment to the above, were also sown with mixed grain and fertilized as above.

The seed was sown June 11, at the rate of 3 bushels per acre. The mixed grain was in the proportion of 2 bushels oats, 1 bushel barley, and ½ bushel peas. The yield per acre obtained from this field is as follows :—

	Bush.	Lbs.
1 acre oats (Imported Irish)	31	10
1 " (Rosedale)	33	8
1 " (Banner)	35	26
1 acre mixed grain	36	6
1 " (not fertilized)	30	6
5 " (fertilized)	37	..

FIELD CROPS OF MIXED GRAIN.

To find out the gain, if any, of seeding heavy, an experiment was conducted on plots of one acre each with mixed grain. The grain was mixed in the same proportion as that sown on the above field. This field had as a previous crop mixed grain, this being the first time the land had been ploughed for many years, never having been manured.

The field was ploughed in the fall of 1899 to an average depth of 6 inches, and in the spring was once worked with the disc, spring-tooth and smoothing harrows. Complete fertilizer at the rate of 200 pounds per acre was drilled in with the grain. The grain was sown June 8.

Two acres were marsh mudded at the rate of 90 tons per acre, and one acre of this was left without fertilizer, the other being fertilized at the rate of 100 pounds per acre. The following yields were obtained from the five acres :—

	Bush.	Lbs.
1 acre, 2 bushels seed sown per acre	30	12
1 " 2½ " "	36	24
3 " 3 " "	39	8
1 " 3 " " mudded and fertilized	43	12
1 " 3 bushels seed sown per acre, mudded and no fertilizer used	40	

FIELD CROPS OF OATS ON MARSH.

Five acres of marsh was ploughed in the fall of 1899, and in the spring it was worked up with the spade and spring-tooth harrows. It was sown by hand at the rate of 3½ bushels per acre. Banner oats were used.

Clover and timothy were sown at the same time at the rate of 3 pounds alsike and 7 pounds Mammoth red clover, with 12 pounds of timothy seed per acre. The land was harrowed once with the spring-tooth harrow after the grain was sown, and once with the smoothing harrow after the grass-seed was sown. No fertilizer of any kind was used. The yield per acre was 53 bushels 15 pounds.

EXPERIMENTS WITH BUCKWHEAT.

The land on which this grain was grown was a clay loam. The previous crop was mangels, having received 30 one-horse cart loads of stable manure per acre, and complete fertilizer at the rate of 200 pounds per acre. The land was ploughed after this crop was removed in the fall of 1899, and in the spring was worked up twice with the spring-tooth harrow and once with the smoothing harrow.

The seed was sown June 16 in one-fortieth acre plots, and complete fertilizer at the rate of 100 pounds per acre was drilled in with the seeder. The following yields were obtained from the five varieties under test :—

BUCKWHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Silverhull.	Sept. 4	83	43	Stiff	5,000	49	8	52
2	Japanese	" 5	84	44	"	5,800	48	16	48
3	Rye	" 5	84	45	"	4,600	45	40	52
4	Tartarian or Siberian	" 4	83	42	"	4,000	41	32	50
5	Grey	" 4	83	44	"	5,000	38	16	49

FIELD CROPS OF BUCKWHEAT.

Five acres of buckwheat was grown on land which had pease as a previous crop, this crop being ploughed under as a green manure in September, 1899. The land previous to that being exceptionally poor, never having had any manure applied. It was again ploughed in the late fall of 1899. In the spring the field was worked up and seeded June 21, one-half being fertilized with 200 pounds of Albert Thomas' Phosphate per acre, and the other 2½ acres received no fertilizer of any kind. The yield obtained is as follows :—

	Bush.	Lbs.
2½ acres fertilized	34	10
2½ acres not fertilized	21	19

Five acres of new land was also seeded to buckwheat, it being in buckwheat the previous year. No fertilizer was applied to this land. The yield was at the rate of 19 bushels per acre.

EXPERIMENTS WITH CORN.

The soil on which the corn was grown is a light clay loam. It was manured on the sod in the early spring with twenty-five one-horse cartloads of stable manure per acre. The previous crop was clover and timothy. The manure, together with a good growth of grass, was ploughed under June 5. The ground was then worked up by going over it once each with the spring-tooth, disc, and smoothing harrows.

Shallow marks were made 3 feet apart, and complete fertilizer, at the rate of 200 pounds per acre, was scattered along, the seed dropped and all lightly covered. Duplicate plots were sown in hills 3 feet apart. The same quantity of fertilizer as the above was used per acre, the seed dropped, and both covered lightly.

The season was fairly favourable, but rather wet, with the exception of a period during the latter part of August, and beginning of September, when splendid growth was made, and many of the varieties matured quite sufficiently for good ensilage. Owing to the other farm work being backward, on account of broken weather, the corn crop was harvested late, but it was noticeable that the crop matured very little during the last two weeks, it being both wet and cold.

Thirty-two varieties were sown June 7. The crop was cut October 8, not having sustained any frost The yield per acre is calculated from two rows, each 66 feet long:—

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Leafiness.	When Tassell-ed.	In Silk.	Condition When Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
		Inches.					Tons.	Lbs.	Tons.	Lbs.
1	Rural Thorobred White Flint	106	Medium.	Sept. 15	......	Silked	28	750	27	1,550
2	Champion White Pearl..	108	"	" 12	....	"	27	1,550	27	1,000
3	Superior Fodder.........	98	"	" 15	....	Early milk..	26	1,900	23	200
4	Cloud's Early Yellow....	105	"	" 3	Sept. 18	" ..	25	600	25	1,150
5	Mammoth Cuban..	96	"	" 1	" 15	" ..	24	1,500	26	1,350
6	North Dakota White....	105	Very.	Aug. 21	" 3	" ..	24	950	23	750
7	Pride of the North	98	Medium..	Sept. 10	" 17	" ..	24	950	22	550
8	Red Cob Ensilage.	90	"	" 15	....	Silked.....	24	70	25	1,150
9	Early Butler	94	"	" 1	Sept. 18	Early milk..	23	1,850	20	1,250
10	Early Mastodon.........	104	"	" 6	....	No ears.....	23	1,850	22	550
11	Giant Prolific Ensilage ..	100	"	" 15	....	Silked......	23	970	20	150
12	King of the Earliest. ...	108	"	" 15	....	Early milk..	23	979	19	1,050
13	Angel of Midnight......	90	Very.	Aug. 21	Sept. 1	Glazed	25	750	19	1,600
14	Selected Leaming	108	Medium..	" 25	" 5	Early milk..	23	420	21	350
15	White Cap Yellow Dent.	104	"	Sept. 1	....	" ..	22	1,650	21	50
16	Evergreen Sugar........	103	"	" 3	. .....	" ..	22	1,100	20	700
17	Canada White Flint.....	98	Very.	Aug. 25	Sept. 1	" ..	22	550	21	350
18	Country Gentleman......	98	Medium..	Sept. 1	....	Silked.....	22	550	20	1,800
19	Mammoth 8 Rowed Flint	100	" ..	Aug. 23	Sept. 3	Soft glazed .	21	1,670	21	1,450
20	Longfellow....	90	Very.	" 20	" 1	Glazed......	21	1,670	21	1,450
21	Pearce's Prolific.........	96	" ...	" 20	" 1	"	20	1,800	21	350
22	Sanford.	90	"	" 23	" 15	Late milk...	20	1,550	22	....
23	Early August...........	85	Medium..	Sept. 1	....	Silked... .	20	1.250	20	1,250
24	Salzer's All Gold........	90	" ..	" 1	....	"	20	.....	18	1,400
25	Kendall's Early Giant. ..	85	" ..	Aug. 20	Sept. 5	Late milk ..	19	1,600	16	1,550
26	Extra Early Huron Dent	104	" ..	" 23	" 8	Soft glazed..	19	500	15	1,900
27	Compton's Early........	88	Very.	" 20	" 1	Glazed......	18	1,950	17	1,750
28	Mitchell's Extra Early...	66	" ...	" 13	Aug. 23	"	13	950	14	50
29	Extra Early Szekely	84	"	" 15	" 24	"	13	950	11	1,650
30	Yellow Six Weeks.......	72	"	" 13	" 20	"	11	1,870	10	1,250
31	Yellow Dakota.....	64	"	" 13	" 23	" . .	11	.....	11	1,100
32	Salzer's Earliest.........	90	"	Sept. 1	Sept. 15	Soft glazed..	9	700	8	500

EXPERIMENTS WITH SORGHUM AND BROOM CORN.

One variety each of Sorghum and Broom Corn were sown June 7. The land was a light clay loam, similar to that on which the other corn was grown, having received the same treatment as the corn plots, being on adjoining land.

The seed was sown in rows 3 feet apart, and complete fertilizer, at the rate of 200 pounds per acre, applied. The crop was cut October 8, and the following yield was obtained, calculated from two rows, each 66 feet long:—

	Yield per acre.	
	Tons.	Lbs.
Early Amber Sugar Cane......	8	650
Broom Corn......	9	230

CORN SOWN IN ROWS AT DIFFERENT DISTANCES.

The experiments carried on last year with three varieties of corn, Champion White Pearl, Longfellow and Selected Leaming, by sowing the rows at different distances apart, to find out which distance will give the largest yield per acre, were this year continued.

The land on which these were grown was the previous year in pease, having been ploughed in the fall of 1899, and manured and worked up the following spring. Stable manure, at the rate of thirty one-horse cartloads per acre, was spread and ploughed under. The ground was worked up, and the seed sown with the seed drill June 13. The crop was cut and weighed October 4. The yield per acre was calculated from a plot of one-fortieth acre, as follows :—

CORN AT DIFFERENT DISTANCES APART.

Name of Variety.	Distances.	Yield per Acre.	
	Inches.	Tons.	Lbs.
Longfellow	21	21	1,240
"	28	18	1,275
"	35	18	1,620
"	42	15	1,200
Selected Leaming	21	18	1,600
"	28	15	1,950
"	35	15	495
"	42	15	
Champion White Pearl	21	20	1,360
" "	28	16	1,725
" "	35	16	1,915
" "	42	15	576

FIELD CROPS OF CORN.

The land on which the field corn was grown was similar, and received the same treatment, as that on which the uniform test plots were grown, being a continuation of the same field. It received twenty-five one-horse cartloads of barn-yarn manure, and 200 pounds of complete fertilizer per acre. The corn was sown in rows 3 feet apart, with the seed drill, and the fertilizer was drilled in by allowing the fertilizer attachment to run when sowing the corn.

The seed was sown June 8. Two varieties were grown in one-half acre plots, and five varieties in one-quarter acre plots. The following table gives the yields per acre, and the condition of the crop when cut :—

FIELD CORN.

Name of Variety.	Yield per Acre.		Condition when Cut.
½-Acre Plots.	Tons.	Lbs.	
Longfellow	21	500	Glazed.
Red Cob Ensilage	20	1,930	Early milk.
¼-Acre Plots.			
Compton's Early	17	1,740	Glazed.
Extra Early Huron	17	700	Soft glazed.
Cloud's Early Yellow	18	1,500	Early milk.
Angel of Midnight	22	300	Glazed.
Canada White Flint	23	1,000	Early milk

EXPERIMENTS WITH TURNIPS.

The soil of these plots was a clay loam. The previous crop was oats, and the Mammoth Red Clover sown with this crop made a good mat to plough under. In the fall of 1899, stable manure, at the rate of fifteen one-horse cartloads per acre, was spread on and ploughed under with the clover. In the following spring this was harrowed with the disc and smoothing harrows, and fifteen one-horse cartloads of stable manure again applied and ploughed under. This was then gone over twice with the disc, once with the spring-tooth, and once with the smoothing harrows, after which 100 pounds of bone meal and 100 pounds of complete fertilizer per acre was sown, and harrowed in with the smoothing harrow.

The land was drilled into rows 24 inches apart. The rows were raked off by hand, a mark made along the top of the row, and the seed dropped, and lightly covered, after which the land roller went over them. In the field crops, where part were rolled after seeding, and others left unrolled, the plants started much more regular and vigorous where not rolled.

The first series of plots were sown May 29, and duplicate ones two weeks later, June 12. Both the early and late sown plots were pulled November 3, and the yield per acre calculated from two rows, each 66 feet long. Twenty-eight varieties were planted, with results as follows :—

TURNIPS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Skirvings	42	1,800	1,430	..	26	1,625	893	45
2	Imperial Swede	42	1,305	1,421	45	29	1,400	990	
3	Hartley's Bronze	42	975	1,416	15	25	1,975	866	15
4	Monarch	42	480	1,408	..	23	1,850	797	30
5	Carter's Elephant	42	480	1,408	..	21	1,725	729	45
6	Selected Champion	40	1,675	1,361	15	25	325	838	45
7	Kangaroo	40	850	1,347	30	26	1,150	852	30
8	Drummond Purple Top	38	1,880	1,298	..	26	1,625	893	45
9	Hall's Westbury	38	1,550	1,292	30	27	450	907	30
10	Pearce's Prize Winner	37	1,900	1,265	..	26	1,625	893	45
11	East Lothian	37	1,075	1,251	15	28	1,750	967	30
12	Halewood's Bronze Top	37	1,075	1,251	15	28	100	935	
13	Shamrock Purple Top	37	745	1,245	45	23	1,850	797	30
14	Prize Purple Top	37	250	1,237	30	26	800	880	
15	Elephant's Master	37	250	1,237	30	26	1,625	893	45
16	Mammoth Clyde	36	600	1,210	..	21	1,725	729	45
17	Perfection Swede	35	950	1,182	30	25	1,975	866	15
18	Bangholm Selected	35	125	1,168	45	23	1,025	783	45
19	New Arctic	34	1,300	1,155	..	22	1,375	756	15
20	Magnum Bonum	34	1,300	1,155	..	29	1,400	990	
21	West Norfolk Red Top	33	1,980	1,133	..	28	925	948	45
22	Jumbo	33	1,650	1,127	30	22	1,375	756	15
23	Champion Purple Top	33	.....	1,100	..	24	675	811	15
24	Selected Purple Top	33	.....	1,100	..	30	1,050	1,017	30
25	Marquis of Lorne	31	1,525	1,058	45	18	1,455	624	15
26	Giant King	30	225	1,003	45	18	1,950	632	30
27	Sutton's Champion	30	.....	1,000	..	29	575	976	15
28	Webb's Renown	27	1,275	921	15	26	1,625	893	45

FIELD CROPS OF TURNIPS.

The ground on which this crop was grown was previously in corn, having been manured with stable manure, 20 one-horse cart loads per acre, and bone meal and complete fertilizers each at the rate of 100 pounds per acre. After the corn crop was removed, in the fall of 1899, the field was ploughed. In the spring it was disc-harrowed and 18 one-horse cart loads of stable manure per acre spread and ploughed under. It was then worked up with the disc, spring-tooth and smoothing harrows, after which complete fertilizer at the rate of 200 pounds per acre was sown and harrowed in.

Drills were run 24 inches apart and the seed was sown with the turnip seeder One variety was sown on a one-quarter acre plot, four varieties on one-half acre plots, and another variety on a two acre piece. The yield from these field tests were as follows :—

FIELD CROPS.—TURNIPS.

Name of Variety and size of plot.	Yield per acre.		Yield per acre.	
	Tons.	Lbs.	Bush.	Lbs.
¼ acre plot :—				
Purple Top	25	1,920	865	20
½ acre plot :—				
Kangaroo	29	205	970	5
Elephant	28	1,172	952	52
Laing's Purple Top	27	1,895	931	35
Drummond Purple Top	27	1,247	920	47
2 acres plot :—				
Selected Purple Top	26	1,000	833	20

EXPERIMENTS WITH MANGELS.

Twenty-three varieties of mangels were sown May 29, and duplicate ones two weeks later, June 12. The land adjoined that on which the turnips were grown was similar in character and received the same treatment, namely, manured in the fall and spring, with 30 one-horse cart loads of stable manure per acre, 15 loads being given at each time, the ground well worked up in the spring, and 200 pounds of complete fertilizer per acre sown broadcast and harrowed in with the smoothing harrow.

Drills were run 24 inches apart, after which they were raked off by hand, and the seed planted in holes made by a marker, one foot apart, into which from three to six seeds were dropped. The seed was lightly covered and rolled. On field crops of mangels rolled this year alongside of those unrolled, the latter started much more regular and thrifty.

The crop from these plots was pulled October 25, and the following yields obtained, being calculated from two rows each, 66 feet long :

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Sutton's Prize Winner	51	1,125	1,719	45	33	650	1,127	30
2	Lion Yellow Intermediate	50	1,805	1,696	45	32	1,175	1,086	15
3	Giant Yellow Intermediate	49	175	1,636	15	30	1,875	1,031	15
4	Giant Yellow Half Long	47	875	1,581	15	28	100	935	..
5	Mammoth Intermediate	47	875	1,581	15	33	825	1,113	45
6	Giant Yellow Globe	43	625	1,443	45	39	375	1,306	15
7	Yellow Intermediate	43	625	1,443	45	25	1,150	852	30
8	Champion Yellow Globe	41	1,325	1,388	45	30	1,872	1,031	15
9	Mammoth Long Red	41	1,325	1,388	45	30	1,875	1,031	15
10	Yellow Fleshed Tankard	41	5	1,366	45	28	1,255	954	15
11	Prize Mammoth Long Red	40	1,675	1,361	15	25	1,150	852	30
12	Selected Mammoth Long Red	40	25	1,333	45	28	100	935	..
13	Gate Post	40	25	1,333	45	30	225	1,003	45
14	Norbiton Giant	39	375	1,306	15	31	1,525	1,059	45
15	Canadian Giant	37	250	1,237	30	28	1,750	962	30
16	Golden Fleshed Tankard	35	950	1,182	30	26	305	871	45
17	Mammoth Oval Shaped	34	475	1,141	15	28	1,750	962	30
18	Gate Post Yellow	33	1,650	1,127	30	25	655	844	15
19	Ward's Large Oval Shaped	33	1,650	1,127	30	24	1,500	825	..
20	Warden Orange Globe	32	175	1,069	35	28	925	948	45
21	Half Long Sugar Rosy	30	1,875	1,031	15	22	1,375	756	15
22	Half Long Sugar White	27	1,275	921	15	26	1,025	883	45
23	Red Fleshed Tankard	26	1,625	893	45	21	1,725	728	45

FIELD CROPS OF MANGELS.

This land was previously in oats, and Mammoth Red Clover, which was sown with the grain, gave a good mat of growth to plough under.

The field was ploughed in the fall of 1899, and the following spring was harrowed, after which manure at the rate of 30 one-horse cartloads per acre was ploughed under. This was then worked up with the disc, spring-tooth and smoothing harrows, after which, complete fertilizer at the rate of 200 pounds per acre was sown broadcast and harrowed in.

Drills were run 24 inches apart and the seed planted in holes one foot apart, made with a marker, from 3 to 6 seeds being dropped in a place. Part of these were covered by running a land roller over the rows, and part by hand with a garden rake ; the latter came up more regular and healthy. Three varieties were grown in acre plots, and one variety in a one-quarter acre plot.

Name of Variety and size of plot.	Yield per acre.		Yield per acre.	
	Tons.	Lbs.	Bush.	Lbs.
1 acre plot :—				
Mam. Long Red	26	62	867	12
Yellow Intermediate	28	1,645	960	45
Yellow Globe	26	1,410	890	10
¼ acre plot :—				
Long Red	18	1,600	626	40

EXPERIMENTS WITH CARROTS.

The carrot plots were on land adjoining the turnip and mangel plots, which was of similar character and received the same treatment.

The rows were 24 inches apart, and were raked off, a mark being made along the top of the row, into which the seed was dropped and covered, after which the rows were rolled.

Nineteen varieties were sown May 29, and a duplicate set of plots two weeks later, June 12. The crop was pulled October 25.

The following results were obtained, the yield per acre being calculated from 2 rows, each 66 feet long :—

CARROTS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre — 1st Plot.		Yield per Acre — 1st Plot.		Yield per Acre — 2nd Plot.		Yield per Acre — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Half-long White....	30	1,875	1,031	15	15	195	503	15
2	Mammoth White Intermediate....	29	80	968	00	16	505	541	45
3	Green Top White Orthe....	26	1,955	899	15	12	255	404	15
4	Giant White Vosges....	25	325	838	45	15	195	503	15
5	Ontario Champion....	25	325	838	45	12	255	404	15
6	New White Intermediate....	23	1,025	783	45	17	650	577	30
7	Early Gem....	22	1,705	761	45	15	855	514	15
8	White Vosges Large Short....	21	405	706	45	10	955	349	15
9	Improved Short White....	21	75	701	15	17	155	569	15
10	Long Scarlet Altringham....	19	1,600	660	00	9	1,305	321	45
11	Guerande or Ox-Heart....	19	775	646	15	13	895	448	15
12	Iverson's Champion....	19	280	638	00	14	875	481	15
13	White Belgian....	18	1,455	624	15	12	1,575	426	15
14	Half-long Chantenay....	17	1,475	591	15	15	1,680	528	00
15	Yellow Intermediate....	17	650	577	30	13	400	440	00
16	Long Orange or Surrey....	17	320	572	00	9	1,305	321	45
17	Carter's Orange Giant....	17	25	567	5	10	1,450	357	30
18	Scarlet Intermediate....	14	1,205	486	45	9	150	302	30
19	Scarlet Nantes....	14	875	481	15	9	975	316	15

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were sown May 29, and a duplicate set of plots on June 12. These plots were on land adjoining the other two plots, and was of similar character, receiving the same treatment. The seed was planted in the same manner as the mangel plots. The crop was pulled October 24, and the yield per acre has been calculated from the weight of the crop from 2 rows, each 66 feet long :—

SUGAR BEETS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre — 1st Plot.		Yield per Acre — 1st Plot.		Yield per Acre — 2nd Plot.		Yield per Acre — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Imperial....	37	1,075	1,251	15	23	1,355	789	15
2	Red Top Sugar....	35	125	1,168	45	23	200	770	00
3	Danish Red Top....	30	1,875	1,031	15	25	325	838	45
4	Wanzleben....	28	1,225	954	15	19	1,005	650	05
5	Danish Improved....	25	325	838	45	20	425	673	45
6	Vilmorin's Improved....	22	1,375	756	15	21	1,725	728	45

EXPERIMENTS WITH POTATOES.

The soil on which the potatoes were grown was a heavy loam. The previous crop was oats and pease, cut green for feed ; manure at the rate of 30 one-horse cartloads per acre was spread and ploughed under in the early fall of 1899. In the spring the land was harrowed with the disc and smoothing harrows and again ploughed, after which the disc and smoothing harrows were again used. Drills were run 30 inches apart and potato fertilizer at the rate of 400 pounds per acre was scattered along in the drill.

The seed was cut leaving from two to three eyes in each piece, and planted one foot apart in the drills and covered with the plough.

Eighty-one varieties were planted June 6 and dug October 16. The plots made vigorous growth. Bordeaux mixture was sprayed on the plants July 27, August 17 and 27. The potatoes in neighbouring fields were exceptionally bad from blight, while these plots were apparently clear of it, which was no doubt due to the use of the Bordeaux mixture.

The crop was harvested late, due to the exceptionally wet weather, making it impossible to harvest them earlier, consequently increasing the percentage of rot. The yield per acre is calculated from two rows each, 66 feet long, as follows :—

POTATOES—TEST OF VARIETIES.

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Holborn Abundance..	605	..	572	..	33	.	490	36	81	24	Round, white.
2	Irish Daisy..	589	36	512	36	77	..	385	..	127	36	"
3	Irish Cobbler	536	48	470	48	66	..	382	48	88	..	"
4	Everett	506	..	446	36	59	24	352	..	94	36	Flattish, pink.
5	Pearce's Prize Winner	501	36	457	36	44	..	347	36	110	..	Long, white.
6	Seattle....	495	..	440	..	55	..	363	..	77	..	"
7	Northern Spy	492	48	470	48	22	..	396	.	74	48	Round, red.
8	Sharpe's Seedling....	490	36	439	24	50	36	358	36	81	24	Round, pink and white.
9	Vanier	484	..	473	.	11	..	352	..	121	..	Long, pink.
10	Early Puritan.. .. .	484	..	402	36	81	24	325	36	77	..	" white.
11	Bill Nye	477	24	435	36	41	48	385	..	50	36	Round "
12	Burnaby Seedling....	477	24	389	24	88	..	312	24	77	..	" pink.
13	Clay Rose.	477	24	462	..	15	24	330	..	132	..	" "
14	Carman No. 1........	475	12	421	48	52	48	325	36	96	48	Flat, round, white.
15	Early Six Weeks . .	473	..	363	..	110	..	264	..	99	..	Oblong, pink.
16	American Wonder....	473	..	374	..	99	..	308	..	66	..	Round, white.
17	Bruce's White Beauty	468	36	411	24	57	12	330	..	81	24	Long, white.
18	Seedling No. 7.. .	466	24	444	24	22	..	385	..	59	24	Oval, pink.
19	Bovee................	466	24	415	48	50	36	330	..	85	48	Long "
20	Columbus..	462	..	343	12	118	48	259	36	83	36	" " and white.
21	Rural Blush..........	462	..	424	36	37	24	314	36	110	..	Round, pink.
22	Ohio Junior	462	..	387	12	74	48	310	12	77	..	" "
23	Pride of the Market ..	455	24	334	24	121	..	253	..	81	24	Long pink and white.
24	Hale's Champion.....	451	..	429	..	22	..	319	..	110	..	Long, white.
25	Dreer's Standard	451	..	378	24	72	36	301	24	77	..	Round "
26	Empire State .. .	451	..	374	..	77	..	303	36	70	24	Oval "
27	Dakota Red	451	..	451	..	....	...	374	..	77	..	Round, red.
28	Seedling No. 230.....	451	..	440	..	11	..	374	..	66	..	" white.
29	Early Norther......	448	48	315	24	103	24	242	..	103	24	Long, pink and white.
30	Cambridge Russet....	448	48	415	48	33	..	305	48	110	..	Round, white.
31	American Giant	444	24	367	24	77	..	308	..	59	24	Long, white.
32	Flemish Beauty	444	24	356	24	88	..	290	24	66	..	" flat, pink.
33	Early Market........	444	24	389	24	55	..	308	..	81	24	Round, pink.
34	Sir Walter Raleigh...	440	..	407	..	33	..	352	..	55	..	" " and white.
35	Quaker City..........	437	48	374	..	63	48	332	12	41	48	" white.
36	Rose, No. 9.........	435	36	429	..	6	36	371	48	57	12	Oblong, pink.
37	Great Divide	435	36	363	..	72	36	275	..	88	..	Long, white.
38	New Queen....... ..	435	36	347	36	88	..	275	..	72	36	Oblong, pink.
39	Beauty of Hebron	433	24	363	..	70	24	297	..	66	..	Round, pink and white.
40	Swiss Snowflake	431	12	400	24	30	48	356	24	44	..	Round, white.
41	Delaware.......... ..	424	36	380	36	44	..	308	..	72	36	" "
42	New Variety No. 1...	424	36	380	36	44	..	314	36	66	..	" pink.
43	Thorburn	422	24	327	48	94	36	270	36	57	12	Oblong, pink and white
44	Maggie Murphy	422	24	281	36	140	48	235	24	46	12	Long, pink.
45	Rochester Rose	420	12	404	48	15	24	343	12	61	36	Oblong, pink.
46	Early Harvest..	418	..	367	24	50	36	297	..	70	24	Oval, pink and white.
47	Burpee's Extra Early.	418	..	347	36	70	24	275	..	72	36	Long " "
48	Clarke's, No. 1	418	..	330	..	88	..	264	..	66	..	Long pink.
49	Troy Seedling........	418	..	374	..	44	..	308	..	66	..	Round, white.
50	Prize Taker	413	36	319	..	94	36	233	12	85	48	" "
51	Uncle Sam	413	36	369	36	44	..	330	..	39	36	Oblong "
52	Maule's Thoroughbred	407	..	330	..	77	..	242	..	88	..	" "
53	I. X. L	402	36	314	36	88	..	270	36	44	..	Long, pink and white.
54	Brown's Rot Proof....	402	36	402	36	....	....	215	36	187	..	Oval, white.
55	Money Maker	396	..	330	..	66	..	242	..	88	..	Long, pink and white.
56	Green Mountain......	396	..	332	12	63	48	270	36	61	36	Oval, white.
57	Carman, No. 3.......	396	..	347	36	48	24	275	..	72	36	Round "

POTATOES—TEST OF VARIETIES—*Continued.*

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
58	Vick's Extra Early...	396	..	345	24	50	36	286	..	59	24	Oval, white.
59	Early Ohio..........	385	..	336	36	48	24	270	36	66	..	Long, pink.
60	Daisy..............	385	..	336	36	48	24	242	..	94	36	" pink and white.
61	Reeve's Rose.........	378	24	334	24	44	..	253	..	81	24	" pink.
62	General Gordon	376	12	279	24	96	48	222	12	57	12	Oblong, pink.
63	Lee's Favourite......	367	24	290	24	77	..	226	36	63	48	Round, white.
64	Country Gentleman..	363	..	292	36	70	24	220	..	72	36	Long, pink and white.
65	Early White Prize...	360	48	301	24	59	24	231	..	70	24	Round, white.
66	McIntyre...........	360	48	343	12	17	36	292	36	50	36	" " and blue.
67	Early Rose........	360	48	299	12	61	36	244	12	55	..	Long, pink.
68	Earliest of all........	354	12	341	..	13	12	264	..	77	..	" "
69	Pearce's Extra Early.	352	..	303	36	48	24	231	..	72	36	" "
70	State of Maine	347	36	325	36	22	..	264	..	61	36	Round, white.
71	Houlton Rose......	334	24	275	..	59	24	209	..	66	..	Long, pink.
72	Chicago Market......	334	24	275	..	59	24	231	..	44	..	" red.
73	Early Michigan......	330	..	275	..	55	..	220	..	55	..	" white.
74	Lizzie's Pride........	330	..	297	..	33	..	220	..	77	..	" pink.
75	Reading Giant.......	330	..	330	..	.....	.....	242	..	88	..	Oval, pink.
76	Late Puritan.........	330	..	277	12	52	48	226	36	50	36	Long, white.
77	Brownell's Winner...	325	36	288	12	37	24	215	36	72	36	" pink.
78	Rural No. 2..........	308	..	268	24	39	36	242	..	26	24	Round, white.
79	Polaris..	272	48	261	48	11	..	187	..	74	48	Long "
80	Early Sunrise........	259	36	200	12	59	24	160	36	39	36	" pink.
81	Penn Manor	226	36	158	24	68	12	136	24	22	..	" "

EXPERIMENTS WITH SOJA AND HORSE BEANS SOWN AT DIFFERENT DISTANCES APART.

Experiments, as conducted last year, with soja and horse beans sown at different distances apart, were again carried on this season. The object being to determine whether rows planted closely together will give as large, or larger, returns per acre than those further apart, and also a comparison of these two crops.

The soil was a clay loam, and twenty-five one-horse cart-loads of stable manure per acre was ploughed under in the spring, and worked up with the disc, spring-tooth, and smoothing harrows. The beans were sown with the seed drill June 13, in plots of one-fortieth acre each. The crop was cut October 4, and yields per acre obtained as follows :—

Soja Beans.

Distance apart.	Yield per acre.	
Inches.	Tons.	Lbs.
21..	5	1,200
28..	4	1,900
35..	4	1,700

Horse Beans.

Distance apart.	Yield per acre.	
Inches.	Tons.	Lbs.
21..	7	....
28..	6	1,100
35..	7	500

EXPERIMENTS WITH FLAX.

The soil was similar, and received the same treatment, as that on which the barley plots were grown. The plots were one-fortieth of an acre each. The object of the experiment was to gain information as to the best time for sowing, and the quantity of seed that should be sown to give the heaviest crop. Four sowings were made, a week apart, and two plots were sown at each time, one with seed at the rate of 40 pounds per acre, and the other at the rate of 80 pounds per acre.

The first sowing was made June 6. The results obtained were as follows:—

Flax.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Weight of Straw Per Acre.	Yield per Acre.		Weight per Bushel.
				Lbs.	Bush.	Lbs.	Lbs.
No. 1, 80 lbs. per acre	June 6	Sept. 5	91	4,280	15		52½
No. 1, 40 " "	" 6	" 5	91	3,260	13	32	53
No. 2, 80 " "	" 13	" 9	88	3,880	12	48	53
No. 2, 40 " "	" 13	" 9	88	4,200	11	24	54
No. 3, 80 " "	" 20	" 16	88	3,460	12	8	52½
No. 3, 40 " "	" 20	" 16	88	3,420	10		53
No. 4, 80 " "	" 27	" 20	85	4,280	11	4	50
No. 4, 40 " "	" 27	" 20	85	3,620	12	8	51

EXPERIMENTS WITH MILLETS.

The land for these plots was a clay loam, and had as a previous crop potatoes. It was manured in the fall of 1898 for the potatoes at the rate of 25 one-horse cartloads of stable manure per acre, and potato fertilizer at the rate of 500 pounds per acre was also applied when the potatoes were planted.

The land was ploughed after the potatoes were removed and was worked up the following spring with the disc, spring-tooth and smoothing harrows ; no fertilizer of any kind was used. The seed was sown with the seed drill June 14, and the crop harvested September 15. Seven varieties were grown in plots of one fortieth acre each. The following table gives the yield per acre of green crop cut :—

MILLETS.

Name of Variety.	Yield Per Acre.	
	Tons.	Lbs.
Italian or Indian	16	
Japanese	13	
Golden	10	
White Round or Extra French	9	1000
Moha Hungarian	8	1000
Algerian	8	
Pearl	7	

SPECIAL EXPERIMENTS WITH FERTILIZERS.

As stated in my last annual report, these experiments were laid out for the purpose of ascertaining the relative value of the fertilizers commonly used for field crops of various kinds.

The plots were one-eighth acre each, 38 x 143½ feet, for each kind of fertilizer used. The series of plots were again subdivided into ten strips 14 feet wide each, running lengthwise over all the different fertilizer plots, on which ten different kinds of crops were sown, namely, potatoes, mangels, turnips, carrots, corn, mixed grain, oats, pease, barley and wheat, making in all 140 plots ; a margin of 2 feet was left between each plot and 1 foot between each crop plot.

Two plots were left without any fertilizer as check plots. Each of the crops were sown at about the same time as the uniform test plots of the particular crop, with the same amount of seed per acre and were cultivated in the same manner. The crop of pease was destroyed by the pea aphis and no record was obtained. The following table gives the yield per acre for the other crops. The quantity and kinds of fertilizers used are applied each year. This is the second year of the test :—

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Quantities of Fertilizers Used Per Acre.	Barley, Duckbill.		Oats, Banner.		Wheat, Colorado.		Mixed Grain, Oats, Barley and Pease.		Corn, mixed, Mastodon, White Flint, White Cap.		Turnips.		Mangels.		Carrots.		Potatoes, Delaware and State of Maine. Sound		Potatoes, Rotten.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Manure, 30 tons	64	28	102	32	41	40	94	8	22	1,500	32	1,700	35	1,500	28	500	351	40	66	40
Manure, 15 tons and complete fertilizer, 250 lbs.	66	32	105	30	43	20	102	32	24	500	38	300	36	500	28	300	370		75	
Complete fertilizer, 1,000 lbs.	54	8	94	4	38	20	91	6	19	1,000	32	300	21	1,500	27	1,500	346	40	53	20
" " 500 "	50		88	8	35		88	8	16		30	1,700	23	500	26	1,700	323	20	50	
Check (no fertilizer)	47	44	67	22	31	40	79	14	13	1,000	28	1,500	14	1,000	22	1,000	283	20	28	20
Bone meal, 1,000 lbs.	62	24	97	2	36	40	88	8	15	1,500	33	500	21	1,000	27	500	275		38	20
" 500 "	56	12	85	10	33	20	82	12	16	500	32	1,000	23	1,500	21	1,700	258	20	25	
Ashes, 2,500 lbs.	52	4	82	12	33	20	82	12	16	1,000	24	1,500	22	1,000	21	500	236	40	33	20
Manure, rotted, 20 tons	62	24	100		40		94	8	21	500	36	300	25	300	27	1,700	356	40	45	
Check (no fertilizer)	43	36	61	26	28	20	73	18	8	500	16	1,700	10	300	17	1,700	201	40	20	
Land plaster, 500 lbs.	45	40	64	24	30		76	16	10	1,500	17	1,700	10	1,500	18	1,000	260		55	
Salt, 500 lbs	54	8	79	14	35		91	6	11	1,000	21	200	20		18	1,700	246	40	46	40
Marsh mud, 100 tons	60	20	94	4	36	40	88	8	14		24		27	1,000	21	500	250		53	20
Manure, 20 tons (green)	64	28	100		40		97	2	18	500	32		33	600	26	1,500	345		58	20

EXPERIMENTS WITH FIELD BEANS.

The four varieties of field beans tested last year were again grown this season. They were sown in one-twentieth acre plots June 13, and harvested October 4. The variety White Field Medium did not mature well, only about one-half of its yield being marketable. The variety Mexican Tree did not mature sufficiently to obtain a yield.

	Yield per acre. Bush.	Yield per acre. Lbs.	Lbs. per bushel.
White Marrowfat	34	15	61
California Pea Bean	29	30	61
White Field Medium	20	30	56

HAY.

Seven acres of upland previously in pasture, being seeded down with grain in the spring of 1899, gave a yield of 10 tons 1,015 pounds. The catch of clover and timothy on this piece of land was poor, and the soil also being poor, a small crop was obtained.

Four acres of clover and timothy on the upland seeded down in the spring of 1899, yielded 12 tons 1,995 pounds of prime clover hay. Three acres of timothy on the upland yielded 5 tons 795 pounds.

Four acres of clover and timothy on the marsh seeded in the spring of 1899, yielded 10 tons 825 pounds. Thirty-eight acres of marsh also yielded 59 tons 525 pounds of timothy, clover and couch. Three acres of marsh gave 5 tons, 1,970 pounds of timothy and brood-leaf hay mixed. This made a total of 104 tons 1,125 pounds harvested in good condition.

CANARY SEED.

A plot of canary seed of one-fortieth acre was sown, June 5. The land was a heavy clay loam, and was manured in the spring with 25 one-horse cart-loads of stable manure per acre. This was ploughed under and the land worked up before seeding. The plot was cut September 15, and yielded at the rate of 11 bushels 32 pounds per acre.

SAND VETCH AND COW PEA.

A twentieth-acre plot of each of these crops was sown June 5, on heavy clay loam. It was manured with 25 one-horse cart-loads of stable manure per acre in the spring, and ploughed under. The land was then worked up and the seed sown.

The Cow Pea made weak growth, and soon was badly overrun with weeds. The crop was not of sufficient consequence to harvest, and was ploughed under.

The Sand Vetch made quite a vigorous growth, but did not mature. This was also ploughed under.

EXHIBITIONS ATTENDED.

Some products, to illustrate the various experiments carried on at the farm, were shown at the three provincial exhibitions. Bottled fruit of various kinds, grain in straw and threshed, also roots, potatoes, fodder crops and vegetables.

A wall space of some 500 square feet, and table space of 180 square feet, was filled at the International Exhibition, St. John, N.B., from September 8 to 19, and an equal amount of space was occupied at the Nova Scotia Provincial Exhibition, Halifax, from the 12th to the 20th of September; both these exhibitions being held at the same time made it necessary to prepare two exhibits.

The Prince Edward Island Exhibition at Charlotteton, P.E.I., from the 25th to the 29th, was also attended, and a wall space of 800 square feet, and 250 square feet of table space, was taken up with farm produce and illustrative charts.

I also attended the exhibitions at Sackville and Sussex, N.B.

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of seed grain and potatoes were again distributed in the spring to those who made application.

The following number of packages were sent to the various applicants :—

Oats	293
Barley	83
Wheat	61
Pease	20
Buckwheat	15
Potatoes	253
Total	725

CORRESPONDENCE.

Apart from the receipt and despatch of circulars, there were 1,302 letters received, and 1,077 sent out.

HORSES.

There are seven horses at present kept on this farm, four of which are used exclusively as draught horses, two for general purposes (single or double), and one driver. Only one change has been made during the past year, which was in the case of the driver ; she having become unsound was exchanged for another 3-year old. All are perfectly sound, and in first-class condition.

CATTLE.

The herd on the farm at present consists of :—

1 Guernsey bull, 5 years old.
1 Ayrshire bull, 2½ years old.
1 Ayrshire bull calf.
1 Guernsey bull calf.
1 Holstein bull calf.
2 Guernsey cows.
2 Ayrshire cows.
1 Holstein cow.
2 Ayrshire heifers, 1½ years old.
1 Holstein heifer, 1½ years old.
22 grade milch cows.
4 grade heifers, 1½ years old.
7 heifer calves.

EXPERIMENTS WITH COWS.

The experiment with the dairy herd during the past year was identical with that of 1899, namely, to determine whether a fairly good dairy herd, well fed and cared for, would leave a credit balance, after paying for feed consumed at current prices. The experiment was begun on November 28, 1899, and continued until November 27, 1900.

The prices for feed this year were, on the whole, somewhat lower, while the prices of products was slightly higher than last year. Wheat and bran, $17.50 per ton ; oats and corn (including grinding), each $22 per ton ; peameal, $29 per ton, making an average price of meal ration, in the proportions fed to cows, of 1 cent per pound. Roots, 5 cents per bushel ; ensilage $2 per ton ; hay, $7 per ton, and straw, $3 per ton. The average price of butter for the twelve months was 21 cents per pound, being an advance of 1 cent per pound on last year's price.

The daily rations for cows in full milk in winter was :—Ensilage or roots, 30 pounds, 3 cents ; hay and straw, 20 pounds, 5 cents ; bran and meal, 9 pounds, 9 cents, making a total cost of 17 cents per cow per day. When not milking in winter they were charged $2 per month.

Different quantities were fed to different cows, according to their capacity to consume and produce.

Twelve were in full milk when the experiment began, the remainder coming in fresh at various times until spring. They were kept in the stable from November 1, 1899, until June 1, 1900, except on occasional fine days, when they were allowed out in the yard.

They were fed twice each day only, and had water before them all the time. The temperature of the stable was kept as near 60° Fahrenheit as possible all the time, and the temperature of the water, which was run into the cows pail direct from the spring, was 35° Fahrenheit, being 4° colder than when run into a tank and left there 12 hours, as was formerly done. No bad effect was perceptible from the drinking of colder water, although no experiment was carried on to determine that point.

They were fed, cared for, and milked as regularly as possible by the same persons all the time.

They were put to pasture on June 1, and from that date until July 31 were out night and day. During August they were out at night and in during the day. During September and October they were in the stable at night and in the pasture during the day time.

After June 15, the pasture was practically done, and the cows were fed on green clover in the stable until July 15, after which date they were fed on a mixture of oats, pease and vetches sown for that purpose, at intervals of one week apart. The green feed fed to 30 cows for soiling season of five months, was grown on an area of land not exceeding ten acres.

While milking they were charged $1.50 per month, and while dry they were turned back in the bush pasture and charged $1 per month.

The milk of each cow was weighed at milking twice each day, and a careful record kept of the number of pounds given.

A test of each cow's milk was made from time to time by means of the Babcock milk tester. The weight of butter was determined on the basis that 84 pounds butter fat produces 100 pounds of marketable butter.

The milk was sent to the Nappan dairy station, and the cows were credited with the butter produced, at the prices paid to all patrons of that station, which averaged for the year 21 cents per pound, less 4 cents per pound for manufacturing the butter and hauling the milk.

The skim milk was fed to calves and pigs, and credited to the cows at the rate of 15 cents per 100 pounds.

Nos. 7, 9, 14 and 21 were disposed of to the butcher during the summer, and No. 27, one of the spring calving cows, died of milk fever the day after dropping her calf.

The following table will show the results obtained during the year :—

TEST OF DAIRY HERD.

Number.	Breed.	Days Milking.	Lbs. Milk.	Per cent B. Fat.	Lbs. Butter.	Value Butter at 21c. per lb.	Value Skim Milk.	Total Credit.	Cost of Feed.	Cost of Making Butter at 4c. per lb.	Total Cost.	Profit for Year.
						$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
11	Ayrshire..........	252	8,425	3·4	341.00	71 61	8 42	80 03	41 12	13 64	54 76	25 27
6	Ayrshire Grade	272	7,540	3·4	305·19	64 08	7 54	71 62	35 25	12 20	47 45	24 17
2	Holstein.	256	8,326	3·2	317·55	66 68	8 32	75 00	41 12	12 70	53 82	21 19
5	Ayrshire Grade.........	240	7,164	3·8	323·84	68 00	7 16	75 16	41 12	12 95	54 07	21 08
18	" "	260	6,050	4·0	288·09	60 54	6 05	66 59	39 90	11 52	45 42	21 12
31	Guernsey.	270	5,950	4·4	264·52	55 54	5 95	61 49	30 80	10 58	41 38	20 11
4	Ayrshire Grade.........	364	7,140	3·6	306·00	64 26	7 14	71 40	39 93	12 25	52 18	19 22
30	Jersey Grade.	304	5,460	4·4	286·00	60 06	5 46	65 52	34 85	11 44	46 29	19 23
25	Shorthorn Grade........	260	6,570	3·8	297·21	62 41	6 57	68 98	38 17	11 88	50 05	18 93
3	Ayrshire Grade.........	270	6,040	3·6	258·85	54 35	6 04	60 39	33 90	10 35	44 25	16 14
1	Holstein...............	280	7,825	3·3	307·40	64 55	7 82	72 37	44 20	12 29	36 69	15 68
8	Sh. Ayrshire Grade......	270	6,100	3·6	261·42	54 89	6 10	60 99	35 25	10 45	45 70	15 29
19	Ayrshire Grade.........	245	6,210	3·6	266·14	55 88	6 21	62 09	36 80	10 64	47 44	14 65
15	" "	280	5,830	3·8	263·73	55 38	5 83	61 21	36 50	10 54	47 04	14 17
28	Jersey Grade...........	300	5,940	3·5	247·50	51 97	5 94	57 91	35 00	9 90	44 90	13 01
32	Ayrshire "	282	5,130	3·5	225·65	47 38	5 13	52 51	32 35	9 02	41 37	11 14
17	Guernsey.	210	4,330	4·2	216·59	45 47	4 33	49 80	29 43	8 66	38 09	11 71
13	Ayrshire Grade.........	265	5,420	3 7	238·73	50 13	5 42	55 55	34 81	9 54	44 35	11 20
16	Ayrshire................	285	5,620	3·9	260·92	54 78	5 62	60 40	39 18	10 43	49 61	10 79
22	" Grade.........	275	6,010	3·5	250·41	52 58	6 01	58 59	39 15	10 01	49 16	9 43
12	" "	300	4,965	3·9	230 51	48 40	4 96	53 36	35 31	9 22	44 53	8 83
26	" "	296	5,040	3·6	216 00	45 36	5 04	50 40	33 90	8 64	42 54	7 86
20	" "	240	4,010	3·8	181 40	38 09	4 01	42 10	28 25	7 25	35 50	6 60
23	" "	252	5,120	3·6	219 42	46 07	5 12	51 19	37 07	8 77	45 84	5 35
21	" "	210	3,620	3·9	168 07	35 29	3 62	38 91	27 30	6 72	34 02	4 89
29	" "	252	4,320	4·0	205 71	43 19	4 32	47 51	36 50	8 22	44 52	2 79
24	" "	276	4,534	3·6	194 30	40 80	4 53	45 33	36 51	7 77	42 28	3 05
7	Shorthorn Grade........	210	3,345	3·3	155 21	32 59	3 34	35 93	27 45	6 20	33 65	.....
10	" "	270	444	3·8	187 47	39 36	4 14	43 50	33 90	7 49	41 39	......
14	" "	90	1,930	3·6	82 71	17 36	1 93	19 29	17 45	3 30	20 75	......
9	" "	204	2,160	3·4	87 42	18 35	2 16	20 51	27 30	3 49	30 79	......
27	Jersey Sh. Grade........	148	1,835	4·2	91 75	19 26	1 83	21 09	18 85	3 66	22 51	......

STEER FEEDING—DEHORNING.

This test was carried on with a view to gain information as to the advisability of dehorning full grown steers, at the commencement of a feeding period, whether fed in loose boxes or tied in stalls.

Twelve 3½ year old Shorthorn grade steers were used for this test, in 3 lots of 4 each, of as nearly as possible equal form, fatness and weight.

They were bought on October 30, and weighed on the morning of October 31, after having fasted 14 hours. The horns were then taken off lots 1 and 2, and left on lot 3. Lot 1 were put into a loose box-stall, lots 2 and 3 were tied up in stalls—lot 3 having their horns on.

The dehorning was done with the Keystone dehorning clipper. All bled profusely, some suffering considerably, while others did not seem to mind it much.

On being re-weighed, two days after dehorning, the dehorned steers were found to have shrunk, on average, 50 pounds per steer, and from repeated weighings, at intervals of two days, it was found at November 15, i.e., two weeks after dehorning, they had barely regained their original weight.

The three lots were fed alike all the time. The ration fed per steer per day from November 16 to December 16, was : roots, 75 pounds ; meal, 4 pounds ; hay and straw, 5 pounds of each. From December 16 to January 15 : roots, 50 pounds ; meal, 6 pounds ; hay and straw, as in previous month. From January 15 to February 14 : roots, 25 pounds ; meal, 8 pounds ; hay, 12 pounds. For the remainder of the time until March 31 : 1 pound of oil meal per steer per day was added to the ration of the previous month. They were kept in the stable all the time, except on occasional fine days, averaging probably once a week, when they were allowed out in the yard. They were fed twice each day, at regular intervals, receiving half of their daily ration each time.

They were watered twice each day, from pails fastened in the corner of their manger, receiving all the water they wanted, and the pail being left full each time of watering.

RECORD OF STEERS FED, FROM NOVEMBER 16, 1899 TO MARCH 31, 1900.

TABLE I—LOT No. 1—DEHORNED, FED IN LOOSE BOX.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
17	1,240	1,290	50	1,335	45	1,385	50	1,395	10	1,440	45	1,460	20	1,505	45	1,540	35	1,565	25	325
18	1,200	1,240	40	1,290	50	1,310	20	1,330	20	1,400	70	1,455	55	1,465	10	1,475	10	1,485	10	285
19	1,150	1,220	70	1,260	40	1,300	40	1,320	20	1,360	40	1,405	45	1,455	50	1,470	15	1,505	35	355
20	1,140	1,200	60	1,250	50	1,280	30	1,300	20	1,320	20	1,335	15	1,400	65	1,420	20	1,445	25	305
																				1,270

LOT No. 2.—DEHORNED, TIED IN STALLS.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
11	1,210	1,245	35	1,280	35	1,320	40	1,330	10	1,350	20	1,380	30	1,440	60	1,465	25	1,480	15	270
12	1,200	1,235	35	1,240	5	1,280	40	1,290	10	1,305	15	1,330	25	1,370	40	1,380	10	1,395	15	195
13	1,200	1,230	30	1,245	15	1,280	35	1,300	20	1,320	20	1,365	45	1,380	15	1,410	30	1,425	15	225
14	1,100	1,145	45	1,210	65	1,245	35	1,260	15	1,290	30	1,335	45	1,385	50	1,400	15	1,415	15	315
																				1,005

LOT No. 3.—HORNS ON, TIED IN STALLS.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
9	1,290	1,325	35	1,340	15	1,380	40	1,400	20	1,410	10	1,420	10	1,470	50	1,485	15	1,505	20	215
10	1,220	1,265	45	1,290	25	1,325	35	1,340	15	1,355	15	1,410	55	1,415	5	1,435	20	1,440	5	220
15	1,060	1,090	30	1,140	50	1,160	20	1,180	20	1,210	30	1,230	20	1,280	50	1,300	20	1,320	20	260
16	1,115	1,145	30	1,190	45	1,240	50	1,260	20	1,275	15	1,330	55	1,355	25	1,365	10	1,395	30	280
																				975

The results of this experiment may be thus summed up :

1st. That dehorning reduced the weight of a 1,200 pound steer about 50 pounds.

2nd. That it required about two weeks' feeding to regain that weight lost.

It is, however, much more comfortable working around them, and other things being equal, buyers prefer those with horns off (for shipping).

Dehorning is of no advantage when steers are tied up in stalls, except for the comfort it gives to those caring for them.

The feeding of dehorned steers in a loose-box is an advantage : 1st, in increased gain in flesh ; 2nd, less cost for labour in attending them ; 3rd, manure better made, requiring about 50 per cent more straw to keep them clean, which may be an advantage or a disadvantage, according to the situation and opinion of the feeder.

STEER FEEDING—MEDIUM AND HEAVY FEEDING.

An experiment was also carried on with two lots of 4 steers (Shorthorn grades), with a view to getting information as to the advisability of feeding a medium ration or a more heavy one; lot 1 in this test being fed as were all lots in dehorning test, termed medium feeding. Lot 2 were fed an increase of 2 pounds meal and 25 pounds roots per animal per day for the entire period, the money value of increased feed over lot 1 being 4¾ cents per steer per day for 135 days equal $25.64. As will be shown by the following table, there did not appear to be any gain in flesh from extra feeding. The treatment as regards feeding, watering, general care and weighing was exactly the same as in dehorning test.

RECORD OF STEERS FED, FROM NOVEMBER 16, 1899, TO MARCH 31, 1900.

TABLE II—LOT No. 1.—HEAVY FEEDING.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
1	1,190	1,245	55	1,290	45	1,315	25	1,350	35	1,375	25	1,395	20	1,435	40	1,465	30	1,485	20	295
2	1,240	1,245	5	1,320	75	1,365	45	1,360	0	1,385	20	1,445	60	1,475	30	1,480	5	1,515	35	275
3	1,300	1,365	65	1,375	10	1,415	40	1,425	10	1,465	40	1,495	30	1,515	20	1,525	10	1,545	20	245
4	1,360	1,400	40	1,420	20	1,450	30	1,470	20	1,490	20	1,540	50	1,585	45	1,605	20	1,645	40	285
																				1,100

LOT No. 2.—MEDIUM FEEDING.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
5	1,285	1,330	45	1,355	25	1,360	5	1,360	0	1,410	50	1,435	25	1,495	60	1,495	0	1,515	20	230
6	1,290	1,355	65	1,415	60	1,435	20	1,445	10	1,500	55	1,540	40	1,580	40	1,585	5	1,595	10	305
7	1,120	1,205	85	1,225	20	1,265	40	1,285	20	1,325	40	1,360	35	1,380	20	1,405	25	1,420	15	300
8	1,060	1,090	30	1,130	40	1,170	40	1,195	25	1,205	10	1,220	15	1,240	20	1,240	0	1,255	15	195
																				1,030

The feeds fed were charged at the following prices : 1. Hay, $7 per ton ; straw, $4 per ton ; roots, 5 cents per bushel ; meals : Bran, $17.50 per ton ; cornmeal, $20 per ton ; chop (oats, pease and barley), $22 per ton ; peameal, $28 per ton, and oil cake meal, $30 per ton. The meals fed consisted of varying quantities of the above and was valued at the uniform price of 1⅛ cents per pound. In all costing an average of 15¼ cents per steer per day for the entire period of 135 days.

They were bought on October 30 for 3¾ cents per pound live weight, weighed 9 a.m., after fasting 14 hours, and weighed 24,400 pounds, sold on April 10 for 5½ cents per pound, weighed as when bought as regards fast and weighed 30,000 pounds.

PROFIT AND LOSS.

Twenty steers, weighing when bought 24,400, at 3¾ cents per pound	$ 915 00
Twenty steers, weighing when sold 30,000, at 5½ cents per pound	1,650 00
Balance	$ 735 00
Less cost of food, 160 days at 15½ cents per day	$ 488 80
" extra amount fed 4 steers, 160 days at 4¾ cts. per day	30 40
Condiments (sulphur, &c.)	5 00
	$ 524 20

Allowing labour of attendance offset by manure, leaves at net balance of $210.80.

If, however, we deduct the value of labour by estimate 3 cents per day per steer, we have a balance of $114.80 besides the manure.

SWINE.

An average of from fifty to seventy-five pigs have been kept on the farm during the past year, representing the following breeds : Yorkshires, Berkshires, Tamworths and their several crosses.

Experiments were carried on with the different lots to determine the feeding value of the various feeds commonly fed and different methods of feeding.

The herd on the farm at present is composed of 1 Yorkshire boar, 1 Yorkshire sow, 1 Tamworth boar, 1 Tamworth sow, 1 Berkshire boar, 1 Berkshire sow, the remaining 60 being crosses of those breeds.

EXPERIMENTS WITH SWINE.

(Feeding on Pasture versus Feeding in Pens.)

On June 30 24 pigs, averaging from four to eight weeks old, were taken for this test, sixteen were put on a fairly good clover pasture, one-half acre in extent, on which had been oats and pease the previous year. They were fed 1 pound of shorts and cornmeal, and 5 pounds of skim-milk per pig per day for 90 days, then they were put in several feeding pens.

The other eight pigs of corresponding breed, age and weight were kept in the pens, and during that 90 days were fed on 2 pounds of shorts and cornmeal and 5 pounds skim-milk per pig per day.

After the 90 days they were all fed alike, each pig receiving 3 pounds of meal per day, and 5 pounds of skim-milk per day until they were ready for the market.

The following table will show the results of the tests, the idea being to determine which way of feeding produced the cheaper pork :—

TABLE I.

Weights and gains of Pigs fed in Pasture.

No.	Breeding.	No. of Pigs.	Weight at Start.	Weight at Finish.	Gain.	No. of Days Fed.	Cost per pound Gain.
			Lbs.	Lbs.	Lbs.		Cents.
1	Yorkshire (d) Berkshire (s)...........	5	160	1,190	1,030	165	2·29
2	Yorkshire (d) Tamworth (s)..........	5	175	1,165	990	180	2·68
3	Yorkshire, Tamworth and Berkshire cross............................	2	75	523	448	140	1·53
4	Berkshire..........................	2	138	458	320	120	1·80
5	Yorkshire..........................	2	104	440	336	120	1·71

TABLE II.

Weights and gains of Pigs in Pens.

1	Yorkshire (d) Berkshire (s)...........	3	107	863	756	165	2·26
2	Yorkshire (d) Tamworth (s)..........	2	76	560	484	180	2·61
3	Yorkshire, Tamworth and Berkshire cross............................	1	40	231	191	140	2·45
4	Berkshire..........................	1	76	232	156	120	2·47
5	Yorkshire..........................	1	80	257	177	120	2·19

TEST OF DIFFERENT FEEDS FOR SWINE.

This experiment was carried on with a view to determine the comparative feeding value of the following feeds :—1st. Buckwheat ; 2nd. shorts ; 3rd. cornmeal and crushed oats ; 4th. Peameal and crushed oats, the last two mentioned being fed in the ratio of 2 to 1. This has been carried on during the past two years.

The pigs were put into this test at the age of about 3 months, in lots of four, from the same litters, at their live weight, after fasting 12 hours.

The ration complete consisted of three pounds of one of the above-mentioned feeds, and an average of five pounds of skim milk per pig per day.

When ready for market, one pig was taken from each lot each time, and these were replaced by four from another litter.

Their gains were ascertained from their increased live weight, after having fasted 12 hours.

They were dressed for market on the farm, and the percentage of dressed weight ascertained in each case.

TABLE III.

PEN NO. 1.—Feed: 2 lbs. Corn Meal, 1 lb. Crushed Oats and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
		Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
1	Yorkshire	100	170	70	60	1·16	78·83
2	Berkshire	107	191	64	58	1·10	78·54
3	Yorkshire (d) Berkshire (s)	100	172	72	63	1·14	77·15
4	Yorkshire (d) Tamworth (s)	84	150	66	60	1·10	78·67
5	Berkshire	98	165	67	62	1·07	80·00
6	Tamworth	83	148	65	54	1·20	81·09

PEN NO. 2.—Feed: 2 lbs. Pea Meal, 1 lb. Crushed Oats and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
1	Yorkshire	97	160	63	60	1·05	81·25
2	Berkshire	110	184	74	58	1·27	81·58
3	Yorkshire (d) Berkshire (s)	105	190	85	63	1·34	80·00
4	Yorkshire (d) Tamworth (s)	84	167	63	60	1·05	77·85
5	Berkshire	99	178	79	62	1·27	78·66
6	Tamworth	70	164	74	54	1·37	79·27

PEN NO. 3.—Feed: 3 lbs. Wheat Shorts and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
1	Yorkshire	90	164	74	60	1·23	78·05
2	Berkshire	83	160	77	58	1·32	78·13
3	Yorkshire (d) Berkshire (s)	107	171	64	63	1·01	77·20
4	Yorkshire (d) Tamworth (s)	80	147	67	60	1·10	81·64
5	Berkshire	102	132	70	62	1·12	78·49
6	Tamworth	74	150	76	54	1·40	78·67

PEN NO. 4.—Feed: 3 lbs. Buckwheat and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
1	Yorkshire	92	160	68	60	1·13	78·12
2	Berkshire	100	165	65	58	1·12	77·58
3	Yorkshire (d) Berkshire (s)	112	172	60	63	0·95	81·40
4	Yorkshire (d) Tamworth (s)	71	140	69	60	1·15	80·00
5	Berkshire	84	140	56	62	0·90	80·00
6	Tamworth	77	145	58	54	1·25	78·63

SHEEP.

The sheep on this farm are rather a poor lot, having been kept with the sole object of raising the fertility of a field of ten acres without an additional fertilizer, and for this reason many more sheep were kept on this field than would otherwise have been, and never having had any abundance of feed they have not made much improvement.

On the other hand, while this field only supported (and badly) 25 in 1898, it supported equally well 34 in 1899, and 42 in 1900, with a fair prospect of again supporting an increased number in 1901.

An estimate of the amount of food consumed in winter was made, and lambs were exchanged to the value of that amount; the wool was also exchanged for feed, which was fed to supplement the pasture through the summer. Two of the ten acres were sown with rape (Dwarf Essex) in June, and afforded excellent feed for the entire flock of 42 sheep from September 1 to October 15.

The flock at present consists of 42 sheep, 6 lambs and 1 Shropshire ram.

(s) Sire. (d) Dam.

POULTRY, 1899-1900.

Three varieties of fowls were kept this year. These are the Barred Plymouth Rocks, Black Minorcas and White Leghorns. The Barred Plymouth Rocks and Black Minorcas were practically all young birds, while the White Leghorns were old birds, except three of them, which were one year old.

The pens were made up as follows :—

No. 1.—10 Barred Plymouth Rock hens.

No. 2.—8 Black Minorca hens.

No. 3.—7 White Leghorn hens.

During the winter they were fed on a warm corn-meal mash in the morning, and whole grain in the afternoon, the whole grain being scattered on the floor of the pens. Water was before them all the time, and green ground bones and oyster shells were occasionally given them. After August 1 they were allowed the freedom of the fields.

The eggs laid during the year by the different breeds were as follows :—

No. 1.—10 Barred Plymouth Rocks	602
No. 2.—8 Black Minorcas	526
No. 3.—7 White Leghorns	307

The fowls now on the farm are :—

	Hens.	Pullets.	Cocks.	Cockerels.
Barred Plymouth Rocks	4	10	1	2
Black Minorcas	4	8	0	2
White Leghorns	5	1	0	1

BEES, 1899-1900.

On December 7, 1899, five colonies of bees, weighing respectively, 52 pounds, 28 pounds, 56 pounds, 40 pounds and 46½ pounds were put in their winter quarters in the cellar of the superintendent's house. They were kept at a temperature ranging from 32° to 40° all winter, and put out on their summer stands on May 2, 1900. The light weighing colony, No. 2, 28 pounds, died during the winter, the remainder coming out in fairly good shape. Their respective weights when put out in May were : 42 pounds, 46 pounds, 37 pounds and 32 pounds, being an average of 10 pounds lighter than when put in the cellar. This season was very unfavourable for honey gathering, the bees only gathered enough for self-support.

Three swarms were captured during July, one on the 5th, one on the 9th and one on the 22nd.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. BLAIR.)

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith a report of some of the work done in the horticultural department of the experimental farm for the Maritime Provinces for the year 1900.

From year to year a gradual improvement is noticed in the methods adopted in planting, cultivating, fertilizing and general care of fruit trees in these provinces. An opportunity was afforded during the month of July of visiting many fruit farms in the Annapolis and Cornwallis valleys, and of noting the effect of well directed effort alongside that of indifferent or careless practice. In this province we have, probably, never had a year when the effects of spraying and good cultivation have been so marked as during the past season, and seldom has so much inferior fruit been grown.

Generally speaking, apples were a large crop, and when well cared for the trees were able to produce a good quality of shipping fruit ; but, with an abundant fruitage, a lack of food and moisture, and in many instances with fungous growths unchecked, a surplus of inferior fruit was obtained in place of the high grade that all should have aimed to produce, if the export trade is to be maintained with the greatest advantage.

Those who cultivated, sprayed, and fertilized, have good fruit for market, and those who neglected their orchards, in proportion to the neglect have inferior fruit. The most successful fruit-growers consider cultivation as essential as fertilization, and during the month of June, July, and part of August, the harrow is kept constantly at work.

With an increase of apples the apple scab fungus, if unchecked, also increases The Bordeaux mixture, as a preventive of this, is beyond the experimental stage, and is now recognized by the most skeptical as a necessary part of orchard work, if the most profit is to be obtained.

The apple-tree tent-caterpillars were destructive in the Cornwallis and Annapolis valleys this year. In many cases they were checked by spraying ; some, however, allowed their trees to be defoliated, and others report little effect from spraying. There is no doubt but that this pest can be checked completely by the use of Paris green. The trees should be sprayed before they are in bloom, and the work done thoroughly. Where this was done the report is that the caterpillars were all killed. This pest has a good chance to grow during a considerable period when the trees are in blossom. The general feeling is that no Paris green should be used at this time, and as the custom with many is to put off spraying as long as possible, the result is that no Paris green is used before blossoms open, and by the time they have fallen a great amount of damage has been done. There is no doubt but that this pest is much harder to control after the caterpillars are well grown, but, if good Paris green is properly applied they will certainly be killed.

The plum crop over the three provinces was good, and mostly of good quality. The crop on Prince Edward Island was exceptionally large. Climatic conditions on the Island favour this fruit.

Cherries were a fair crop, pears medium, and strawberries, raspberries and blackberries rather above the average. The condition of the weather during strawberry ripening time favoured this crop.

The crop of small fruits, plums and apples at this farm were above the average. Pears have as yet fruited little, and cherries were a medium crop.

The usual collection of annual flowers were this year grown. Many new varieties of dahlias, and sweet pease, were added, making a very fine display.

A large collection of perennial flowering plants was sent from the Central Farm at Ottawa. They were set in rows 3 feet apart each way. The collection of these plants now numbers over 300 varieties.

The ornamental trees and shrubs have, with few exceptions, made splendid growth. The list is gradually increasing with new ones added each year. The plum aphis has not been so bad this season as formerly. The apple aphis was noticed on some apple trees, but soon disappeared. Tobacco water and whale-oil soap was used and proved quite effective.

Experiments were this year conducted with a whitewash mixture to determine its value for removing the oyster-shell bark-lice from apple trees. It has been found difficult to completely rid some trees of this pest, and those infested were sprayed. Some were sprayed only twice and others as many as six times. Two sprayings are necessary to completely whiten the tree, and as soon as this was washed off the trees were again sprayed. The wash was completely effective on some trees and on others a few lice still remained and young were hatched this spring. It would appear from notes taken that the spray was much more effective when applied as soon as made. This work, while not entirely effective, was quite satisfactory.

I beg to acknowledge the receipt of the following donations : 1 Aylmer spray pump, from the Aylmer Iron Works, Aylmer, Ontario. Plants of the Jessie strawberry, from Mr. Everett Crosby, Brazil Lake, N.S. Plants of the Saunders strawberry, from Mr. J. C. Craig, Amherst, N.S., and apple scions, from Mr. A. C. Starr, Starr's Point, N.S.

APPLE ORCHARDS.

One hundred and sixty-two varieties of apples are now under test on the Nappan farm. The trees in orchard No. 1 where no protection is given are, generally speaking, not so thrifty and vigorous as those in orchard No. 2 where the trees are protected by a shelter belt of spruce on all sides.

Orchard No. 1.—This orchard has made splendid growth during the past season. The soil is a clay loam, on a heavy red clay subsoil, which has been under-drained. The trees were all manured in the fall of 1899 with stable manure, and this was worked in the following spring.

Thorough cultivation was given throughout the season by using the horse cultivator at intervals of a week or ten days until the middle of August. A strip of land 6 feet at each side of the trees was kept clean by this method, and the ground between was given up to grass, grain and hoed crops.

The trees are sprayed every season with Bordeaux mixture four times. The fruit has thus far been practically free from the apple scab fungus. The crop of fruit was fairly good the past season. The late varieties, however, did not mature very well. The early sorts had good colour and quality. The abundant fruitage of some varieties, with slow early spring growth, combined to make the crop somewhat inferior in size and quality.

Paris green is used in all the applications of Bordeaux mixture after the first early one. There is practically no damage from the codling moth or apple worm. Other insect pests have so far given little trouble, with the exception of the oyster-shell bark-louse, which is now, with the use of the lime spray, pretty well eradicated.

Orchard No. 2.—The trees put out in 1891, 1892 and 1893, in this orchard, were planted amongst the stumps. It was found difficult to clean up the land when set, so further work here was postponed until the field was stumped and worked up. In the spring of 1897 the balance of the orchard was set. In the winter of 1895 a number of the trees in the plantation were girdled so badly by mice that they were lost.

The soil is rather light loam, with a clay subsoil. It was under-drained in 1897. The trees have received complete fertilizer and muriate of potash, at the rate of 200 pounds of the former to 100 pounds of the latter per acre, during the past three years, and this fall the land is being manured with stable manure. The soil is naturally very poor. Buckwheat crops were taken off the land two years in succession, and pease have been sown for the past two years, to plough under as a green manure.

The trees are each year sprayed with Bordeaux mixture.

The date of planting, the number of trees growing, their general fruitfulness, character of growth and productiveness is given below. As varieties of fruit, some are found to be improperly named, and two such are not included in this list. Those trees set in 1899 were planted in the fall of the year, all of the other trees have been planted in the spring.

APPLE ORCHARD, No. 1.

Name of Variety.	Date of Planting.	Number of trees grown.	Character of growth.	When fruited and general fruitfulness.
Allen's Choice	1899	1	Strong	
Aport	1889	2	"	1894-96-98-99-1900. Medium.
Ananasnoe	1889	2	"	1895-97-99. Medium.
Anisovka	1890	1	"	1895-97-99 1900. Medium.
Anis	1890	2	"	1894-95-96-97-98-99 1900. Abundant.
Alexander	1890	3	"	1894-96-97-99 1900. Few.
Autumn Strawberry	1895	2	Weak	
Benoni	1890	2	Strong	1896-98-99 1900. Medium.
Blue Pearmain	1890	1	"	1897-99 1900. Few.
Blackwood	1889	2	"	1894-95-96-97-98-99 1900. Medium.
Bank's Gravenstein	1895-98	2	Weak	
Baldwin	1898	1	Fair	
Borovinka	1889	1	Strong	1894-95-96-97-98-99 1900. Medium.
Bottle Greening	1891	1	"	
Boy's Delight	1899	1	Weak	
Buckingham	1895	1	Strong	
Bellflower (Bishop Pippin)	1889-92	3	"	1896-98-99 1900. Few.
Blushed Calville	1895	1	"	
Ben Davis	1893	2	"	1896-97-98-99 1900. Abundant.
Belle de Boskoop	1897	1	Weak	
Canada Baldwin	1890	3	Fair	1894-95 96-97-98-99 1900. Medium.
Canada Red	1890	2	"	1897-99. Few.
Cooper's Market	1895	2	"	
Crimean Bogdanoff	1895	1	Strong	1900. Few.
Carolina Red June	1895	2	Fair	
Colvert	1890-93	3	"	1895-97-99 1900. Few.
Duchess of Oldenburg	1890-92	7	"	1893-94-95-96-97-98-99 1900. Abundant.
Dominie	1895	1	Weak	
Fameuse	1890	4	Strong	1894-96-97-98-99 1900. Medium.
Flory Belle	1894	1	"	
Fallawater	1899	2	Fair	
Golden Reinette	1895	1	Strong	1900. Few.
Golden Ball	1899	1	"	
Golden Russet	1890-92	4	"	1894-95-96-97-98-99 1900. Medium.
Gano	1898	1	"	
Golden White	1895	2	Fair	
Gravenstein	1889-95	3	"	
Hibernal	1894-95	2	Strong	1898-99- 1900. Medium.
Haas	1890	3	"	1892-93-94-95-96-97-98-99 1900. Abundant.
Jonathan	1890	3	Fair	1895-98 1900. Medium.
Keswick Codlin	1890	3	Strong	1895-96-97-98-99 1900. Medium.

APPLE ORCHARD No. 1—*Continued.*

Name of Variety.	Date of Planting.	Number of trees grown.	Character of growth.	When fruited and general fruitfulness.
King of Tompkins Co	1893	2	Weak	
Kohl's Early	1899	1	Strong	
Lady Washington	1899	2	Weak	
La Rue	1898	2	Strong	
Longfield	1889	3	"	1893-94 95-96-98-99 1900. Abundant.
Munson's Sweet	1898	2	"	
Maiden's Blush	1890	3	Fair	1894-95-96-97-98-99 1900. Few.
Milding	1893	1	"	
McIntosh Red	1889	3	Strong	1899 1900. Few.
Mann	1889	2	Fair	1898 1900. Medium.
McMahan White	1897	1	Strong	
Northern Spy	1890	2	Fair	
Ontario	1890-98	3	Weak	1894-95-98-99 1900. Few.
Ostrakoff	1889	1	Strong	1894-95-96-97-98-99 1900. Medium.
Peach	1893-95	4	"	1898 1900. Few.
Princess Louise	1892	2	"	1900. Few.
Pewaukee	1890-92	5	"	1894.95-96-97-98-99 1900. Medium.
Peter	1898	2	Fair	
Peck's Pleasant	1895	1	Strong	
Rome Beauty	1895	2	"	
Rhode Island Greening	1890	3	Fair	1900. Few.
Red Astrachan	1890	5	Strong	1894-95-96-97-98-99 1900. Medium.
Red Russet	1899	1	"	
Roxbury Russet	1893-98	2	Fair	
Red Bietigheimer	1893	1	Weak	
Rambo	1890	2	Fair	1900. Few.
Ribston Pippin	1894	2	Weak	
Sops of Wine	1897	1	Strong	
St. Lawrence	1890	3	"	1897-99 1900. Medium.
Seek-No-Further	1895	2	"	
Sultan	1890	2	"	1894-95-96-97-98-99 1900. Abundant.
Spitzenburg	1894-98	3	Fair	
Serinka	1890	2	"	1898 1900. Medium.
Sweet Bough	1897	2	Strong	
Scott's Winter	1890	2	"	1893-94-95-96-97-98-99 1900. Abundant.
Shannon	1897	1	"	
Trenton	1893	1	"	1896-97-98-99 1900. Abundant.
Tetofsky	1890	1	Weak	1894-95-96-97-98-99 1900. Medium.
Titovka	1889	2	Strong.	1894-95-96-97-98-99 1900. Abundant.
Twenty Oz. Pippin	1893-98	2	"	
Walbridge	1893-98	2	Weak	1900. Few.
Wellington	1893	2	Strong	1897-98-99 1900. Abundant.
Wagener	1890-92	2	Weak	1894-95-96-97-98-99 1900. Few.
Wolf River	1898	2	Strong	
Wealthy	1890-97	3	"	1893-94-95-96-97-98-99 1900. Medium.
Grimes' Golden	1890	3	Fair	1895-96-97-98-99 1900. Medium.
Royal Table	1895	1	Strong	1900. Few.
Pewaukee Russet	1895	1	"	
Talman's Sweet	1890	2	"	1894-95-96-97-98-99 1900. Medium.
Yellow Transparent	1890	5	Fair	1893-94-95-96-97-98-99 1900. Abundant.

ORCHARD NO. 2.

American Blush	1899	1	Strong	
Antonovka	1897	2	"	
Avenarius	1897	2	"	
Atkison	1897	2	"	
Arabka Winter	1897	2	"	
Arabskoe	1897	2	"	
Beautiful Arkad	1897	2	"	
Bell Pippin	1897	2	"	
Bank's Gravenstein	1898	2	Fair	
Blushed Calville	1897	1	Strong	
Brownlee's Russet	1897	2	"	
Bethel	1898	2	"	

ORCHARD No. 2—*Continued.*

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
Blenheim Pippin	1897	1	Strong	
Basil The Great	1897	2	"	
Babbit	1897	1	Weak	
Blue Pearmain	1890	1	Strong	
Belle de Boskoop	1897	1	"	
Ben Davis	1897	1	"	
Bismarck	1899	1	Fair	
Cross	1897	2	Strong	
Charlottenthaler	1898	2	"	
Cinnamon Pine	1895	2	"	
Canada Reinette	1897	1	"	
Cox's Pomona	1897	2	"	
Duchess	1893	1	"	1898-99 1900. Medium.
Derby	1890	2	"	1900. Few.
Danver's Winter Sweet	1897	2	"	
Enormous	1897	1	"	
Early Colton	1897	1	"	
Fanny	1897	2	"	
Fameuse	1893	1	"	1898-99 1900. Medium.
Fallawater	1898	1	Weak	
Golden Sweet	1897	1	Strong	
Grimes' Golden	1890	1	"	1899 1900. Medium.
Golden Russet	1892	1	"	1899 1900. Few.
Gravenstein	1893	1	"	
Gano	1897	2	"	
Golden Reinette	1897	1	"	
Grandmother	1897	2	"	
Headley	1897	2	"	
Hastings	1892	1	"	
Hurlbut	1897	2	"	
Jonathan	1899	1	"	
Jefferis	1897	1	"	
King	1898-99	3	"	
Long Arkad	1897	2	"	
Little Hat	1897	1	Fa r	
Inkerman Greening	1899	2	Strong	
Melonen	1897	1	"	
Mother	1897	2	"	
Missouri Pippin	1897	2	"	
Mammoth Pippin	1899	2	"	
Munson's Sweet	1897	2	"	
Northwestern Greening	1897	2	"	
Newton Pippin	1897	1	"	
Northern Spy	1892-98	3	"	
Newell's Winter	1897	1	"	
Ontario	1897	1	"	
Occident	1897	2	"	
Pipka Winter Bogdanoff	1897	1	"	
Porter	1897	2	"	
Pomme Grise	1897	2	"	
Palmer Greening	1897	2	"	
Patten's Greening	1897	2	"	
Peck's Pleasant	1898	2	"	
Pudky	1899	2	"	
Pewaukee	1891	2	"	1898-99 1900. Medium.
Pointed Pipka	1896	4	"	
Renaud's Seedling	1897	2	"	
Russian Tyrol	1895	1	"	1900. Abundant.
Red Russet	1897-99	2	"	
Red Astrachan	1893	1	"	1900. Few.
Ribston Pippin	1897-99	4	Fair	
Sops of Wine	1897	1	Strong	
Shannon	1897	1	"	
Salome	1898	2	"	
Sunbeam	1897	1	"	
Silken Leaf	1897	2	"	
Sutton's Beauty	1897	1	"	

ORCHARD No. 2—*Concluded.*

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
Smith's Cider	1897	1	Fair	
Summer Rose	1897	1	Strong.	
Shiawassee Beauty	1897	2	"	
Swaar	1897	2	"	
Tulpenhocken	1900	2	Fair	
Tufts' Baldwin	1897	1	Strong	
Twenty Oz. Pippin	1898	1	"	
Uncle Sam	1897	1	"	
Vandevere	1899	1	Fair	
White Pigeon	1897	2	Strong	
Wisner's Desert	1899	2	"	
Watterson	1897	2	"	
Western Beauty	1897	2	"	
Windsor Chief	1897	2	"	
Wealthy	1899	2	"	
Winesap	1897	2	"	
Williams' Favourite	1897	2	"	
White Astrachan	1891	2	"	1896-97-98-99 1900. Abundant.
Winter Bough	1890	3	"	1900. Few.
Wagener	1898	1	Weak	
Walbridge	1898	1	Fair	
Yellow Transparent	1892	1	Strong	1896-97-98-99 1900. Medium.
Hibernal	1897	1	"	
Stump	1898	1	Fair	
York Imperial	1897	1	Strong	

CRAB APPLES.

Nine varieties of crab apples are growing. Some information is given below bearing on their general growth. They are on land adjoining apple orchard No. 1, and have received the same treatment.

CRAB APPLES.

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
General Grant	1892	2	Strong	1895-96-97-98-99 1900. Medium.
Hyslop	1890 93	5	"	1893-94-95-96-97-98-99 1900. Abundant.
Leslie's Sweet	1897	2	Fair	
Montreal Beauty	1990-93	5	Strong	1893-94-95-96-97-98-99 1900. Abundant.
Martha	1893	2	"	1895-96-97-98-99 1900. Medium.
Power's Red	1896	1	Fair	1900. Medium.
Transcendent	1890-93	5	Strong	1894-95-96-97-98-99 1900. Abundant.
Van Wyck	1895	1	"	
Whitney	1890	1	Fair	1893-94-95-96-97 98-99 1900. Medium.

PLUMS.

Sixty-seven varieties of plums are now under test. These have made exceptionally good growth the past year, and some of the varieties fruited well this season.

It has been very difficult during the past five years to keep the trees completely free from the plum aphis. These insects commence operations about the middle of July and continue until September. The difficulty in treating this pest is to kill them all, which seems almost impossible, as they suck the juices of the plant from the under side of the leaf, which soon causes the leaf to curl, thus protecting the insects from a spray. Tobacco water and whale-oil soap are used for spraying. Ten pounds of the tobacco to a cask of water, soaked twenty-four hours, and two pounds of whale-oil soap added is a very effective mixture. The trees must be constantly watched and repeated sprayings given to keep this insect in check.

This season the plum aphis was not nearly so bad as formerly, and it is hoped that these insects will soon disappear, as even with careful attention, the trees suffer more or less injury from them.

In the fall of 1898 black knot broke out on a great number of trees, making it necessary in many cases to remove the entire tree. This had previously given no trouble here, and the few knots which had appeared heretofore were promptly removed before ripening.

One end of this orchard is a very heavy red clay, and on this considerable loss has occurred. The trees on this soil do well for a few years and will then winter-kill at the roots. The tips of some branches have winter-killed, but not sufficient to cause any damage to the tree.

This orchard is lacking in protection which seems to be necessary for successful plum-growing. The following varieties are now under trial :—

PLUMS.

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
Arch Duke	1895	2	Fair	
Bryanston's Gage	1897	2	"	
Baker's Prune	1899	1	Strong	
Black Hawk	1899	1	Fair	
Abundance	1895	1	"	
Burbank	1895	1	Strong	1900, few.
Bradshaw	1892–99	2	Fair	
Botan	1897–99	4	Strong	
Coe's Golden Drop	1891	2	Fair	1900, abundant.
Cheney	1897	2	Strong	
Columbus	1900	2	"	
De Soto	1900	2	Fair	
Duane's Purple	1892	2	"	
Damson	1891–99	3	"	1898 and 1900, abundant.
Grand Duke	1895-1900	3	Strong	
Goliath	1897	2	Fair	
Gueii	1891–93	3	Strong	1900, abundant.
German Prune	1892–99	4	"	1900, few.
Glass Seedling	1900	2	"	
Hawkeye	1899	1	Fair	
Hudson River Purple Egg	1900	2	Strong	
Imperial Gage	1891–93	7	"	1900, abundant.
Italian Prune (Fellenberg)	1893–97	4	"	1900, medium.
James Vick	1899	1	"	
Jefferson	1900	1	"	
Kennedy's Red	1899	1	Weak	
Lambert's Red	1899	1	Fair	
Lombard	1891–99	6	Strong	1898-99 and 1900, medium.
Luscombe's Nonesuch	1897	2	Weak	
Lawrence's Favourite	1891	1	Fair	
Large Red Sweet	1899	1	"	
Leonard	1899	1	"	
Moldavka	1899	1	Strong	
Moore's Arctic	1892–99	4	"	1897-98-99 and 1900, abundant.
Mariana	1899	1	"	
McLaughlin	1900	2	Fair	
Mereton's Egg	1899	1	"	
Monarch	1900	2	Strong	
Niagara	1899	2	"	
Ogon	1897	1	Fair	
Old Gold	1899	2	"	
Orange	1897	1	"	
Oullin's Golden	1897	2	"	
Prince of Wales	1895	2	Strong	
Pond's Seedling	1892	2	Fair	1900, few.
Prince Englebert	1900	2	"	
Prince's Yellow Gage	1892–1900	6	Strong	1900, abundant.
Quackenboss	1897	2	"	
Reine Claude	1891	2	"	
R. B. Whyte's New Seedling	1899	1	Fair	
Reine Claude de Montmorency	1899	1	"	
Red Egg	1900	2	Strong	
Richard	1899	1	"	
Rochford	1899	1	"	
Stoddard	1899	1	"	
Sophie	1899	1	"	
Shipper's Pride	1892	2	"	1898-1900, medium.
Smith's Orleans	1898–1900	3	Fair	
Saunders	1893-1900	3	"	
St. Lawrence	1897	2	Weak	
Victoria	1897	2	"	
Weaver	1897	1	Fair	
Washington	1892–93	3	Strong	
Wickson	1900	2	"	
Yellow Moldavka	1899	1	Fair	
Yellow Egg	1898–1900	3	Strong	
Rollingston	1899	1	Fair	

CHERRIES.

Forty varieties of cherries are now growing here. They are planted 18 feet apart each way. They have received good cultivation, and the trees generally have made strong growth. Considerable loss has occurred from trees dying the following winter after heavy fruitage. The varieties Dyehouse, Montmorency, Governor Wood, Lieb, Napoleon, and Coe's Transparent, planted in 1892, have nearly all died in this way. Some varieties have been lost through the bark at the base of the trunk decaying, also from the bark splitting and curling, causing it to separate from the wood.

Some excellent specimens of the above varieties have been grown. The variety Early Richmond has fruited very little. The only insect so far encountered is the pear, or cherry-tree slug (*Selandria cerasi*), which has not been noticed on the pears, but which each year infests the cherry trees. It is easily destroyed by spraying with Paris green and water—4 ounces of the poison to 40 gallons of water. A large number of cherry trees throughout the Maritime Provinces have been killed by this cherry-tree slug, which eats all of the green part of the leaf, after which the tree looks as if it had been scorched by fire. This insect makes its appearance about the middle of June, and should be attended to promptly.

CHERRIES.

Name of Variety.	Date of Planting.	Number of trees now growing.	Character of growth.	When fruited and general fruitfulness.
Archduke	1897	2	Strong	
Black Eagle	1900	3	"	
Bessarabian	1899	1	"	
Belle Magnifique	1895	2	"	
Black Heart	1892	1	Fair	
Carnation	1897	1	Strong	
Coe's Transparent	1892	1	"	1899-1900, abundant.
Downer's Late Red	1899	1	"	
Dyehouse	1895	2	"	
Early Purple Guigne	1900	2	Fair	
English Morello	1892-93	4	Strong	1894-95-97-98 and 1900, abundant.
Early Richmond	1892	7	"	1895-97-98 and 1900, few.
Griotte Morello	1899	1	Fair	
Governor Wood	1892-98	3	"	1896-97-98-99 and 1900, medium.
Gruner Glass	1895	2	Strong	1898-99 and 1900, medium.
Knight's Early Black	1898	2	Weak	
Lithaur Weichsel	1898	2	Strong	
Lieb	1898	1	"	1900, few.
Late Duke	1892-97	2	Fair	
Montmorency Ordinaire	1898	1	Strong	
Mezel	1899	1	"	
May Duke	1895-99	3	"	
Montmorency	1892-93	4	"	1898-1899, medium.
Napoleon	1900	2	"	
Ostheim	1892	1	"	1896-98 and 1900, abundant.
Ohio Beauty	1895	2	"	
Orel	1893-95	3	"	1898-99 and 1900, abundant.
Olivet	1892	2	"	1895-96-98 and 1900, abundant.
Reine Hortense	1897-99	2	"	
Rockport	1895	1	Fair	
Royal Duke	1897	1	"	
Schmidt	1897	2	Strong	
Sparhawk's Honey	1897	2	Fair	
Shadow Amarelle	1893	2	Strong	1899 and 1900, medium.
Spate Amarelle	1895	1	"	1899 and 1900, medium.
Tradescant's Black Heart	1897-98	2	"	
Vladimir	1895	2	"	
Wragg	1892	2	Fair	1895-96-97-98 and 1900, abundant.
Windsor	1892-93	3	Strong	1900, abundant
Yellow Spanish	1892	1	Fair	

PEARS.

Thirty-two varieties of pears are now growing in the orchard. These are making fair growth. A very large proportion of the pear trees planted in 1892 and 1893, were lost through pear blight (*Micrococcus amylivorus*). This was first noticed in 1896, and by the following season two-thirds of the orchard was destroyed. All of the affected trees have been removed.

The soil on which these trees are planted is a heavy clay loam, under drained. The trees are kept cultivated. The season and soil does not seem favourable to this fruit. The trees are planted 18 feet apart each way. The following are the varieties under test here :—

PEARS.

Name of Variety.	Date of Planting.	Number of trees now growing.	Character of growth.	When fruited and general fruitfulness.
Beurre Clairgeau	1899	4	Strong	
Beurre d'Anjou	1893-99	4	Fair	
Beurre Hardy	1898 99	2	"	
Bezi de la Motte	1897	2	"	
Bartlett-Seckel	1898	1	"	
Bartlett	1892-99	4	Weak	
Bessemianka	1895-97-99	4	Strong	
Buffum	1890	2	Fair	
Clapp's Favourite	1892-95-97	6	"	
Duchesse d'Angouleme	1893-99	3	"	
Doyenne Boussock	1897-99	3	"	
Dempsey	1899	2	"	
Dr. Reeder	1892-97	2	Strong	
Flemish Beauty	1892-99	1	"	1899 and 1900.
Goodale	1900	1	Fair	
Giffard	1900	1	"	
Howell	1900	2	"	
Josephine	1900	2	"	
Kieffer	1895 99	3	Strong	
Louise Bonne de Jersey	1899	2	Fair	
Longworth	1897-98	2	"	
Lawrence	1892	1	Weak	
Matilda	1897	2	Strong	
Mount Vernon	1893	1	Fair	
Seckel	1899	2	"	
Souvenir du Congress	1900	2	"	
Sheldon	1892-93	2	"	
Tyson	1892-95	3	Strong	1899 and 1900.
Onondago	1900	2	Fair	
Osband's Summer	1895	2	Strong	
Vermont Beauty	1895-99	3	"	
Wilder	1899	1	Fair	

EXPERIMENTS WITH STRAWBERRIES.

Experiments to test the relative value of different sorts of strawberries were this year continued. The plants were planted so as to cover 99 square feet when the runners have become established. In order to do this, two rows are set 3 feet apart and 16½ feet long. The plants are put out 1 foot apart in the rows. The runners between these rows fill up the entire space, and are also allowed to run 1½ feet on the outside of the rows. This makes the plot 6 feet wide by 16½ feet long of matted plants. A space of two feet is left between each plot.

Strawberries grown on this matted row system have given good crops here. In field culture the rows should be put 4 or 4½ feet apart, as this would leave a space of 1 or 1½ feet wide for picking the fruit. The plants should be set 18 inches apart in field culture.

After the plants are set, the horse cultivator should be used to stir the ground as close to the plants as possible during their early growth, and gradually the space worked by the cultivator may be narrowed as the runners start out and young plants are produced. It is a good practice to go over the rows after the runners have partly grown, and place them so as to fill all vacant spaces without crowding. A little care at this juncture will increase the yield of fruit on the plot.

Hand hoeing should be carefully attended to, and no weeds allowed to grow. All weeds should be carefully hoed out in the late summer, and the patch kept clean well into fall, for the damp fall weather favours the growth of many sorts of weeds.

If the plantation has been kept clean the first season, it is possible to obtain two fruit crops, but, if not, the plantation should be ploughed up after the first crop is taken off. It is much cheaper to reset a new plantation every year than to clean the weeds out of one which has been neglected during the season after planting.

Spring planting has been found to be the most successful here. Those plants set in the fall are liable to winter-kill unless started very early, and it is difficult to obtain young plants, far enough advanced, to put out in time to get well established before winter comes.

Fall-set plants produce but a limited amount of fruit the next season, and hence one is very little farther ahead with fall-set plants than with those put out the next spring.

Plants for setting should be handled so that their tops will not wilt. In order to prevent this the roots must be kept moist, and the plants sheltered from drying winds as much as possible. Plants that have wilted should be 'puddled' in a mixture of water, and heavy soil, mixed to the consistency of thick paint, before planting. The roots, if dipped in this, will be coated with a thin layer of moist soil, which will preserve them from drying.

Set the plants so that the crown will be level with the ground after it is settled.

Strawberries should be planted on soil well enriched, by using stable manure. If the ground has previously been used for a hoed crop, manure again in the fall after the crop is removed and plough under, and work up again in the spring before planting. A good plan is to scatter complete fertilizer along the rows before planting, which is worked in when setting the plants. About twenty-five one-horse cartloads of barn-yard manure should be used per acre.

The dates of picking, and the quantity of fruit obtained each day, are given in the following table ; also, the total yield per plot for the past three crops. One crop only is taken from a plot ; they were after that ploughed under. The soil is a heavy clay loam, which makes the ground difficult to keep clean and in good tilth by any other method.

Four varieties were also grown in the hill system. Two rows, 3 feet apart, were set, the plants being 1 foot apart in the rows, and at each side of these a row of plants were put out so that four plants would make the corner of a square, the plants all being 1 foot apart each way. The runners were kept cut off all of these plants, and only the plants set allowed to grow. The yield from these was greatly below that of those grown in matted rows, and the fruit was not nearly so clean, being considerably damaged with sand.

Generally speaking, strawberries will not winter without some protection. From 1 to 2 inches of clean straw makes a good covering which should be put on the latter part of November, after the ground is nicely frozen. Spruce boughs have also proved quite satisfactory as a protection.

STRAWBERRIES.

Name of Variety.	Sex.	Date of Picking. July 11.		July 13.		July 17.		July 19.		July 23.		July 26.		July 30.		1900. Total yield from Plot of 99 sq. feet.		1899. Total yield from Plot of 99 sq. feet.		1898. Total yield from Plot of 99 sq. feet.	
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Brandywine	B	..	..	2	..	..	..	8	..	6	8	3	8	..	..	20	..	11	9½	8	6
Bisel	P	..	9	1	12	3	12	4	2	9	8	6	6	2	12	28	13	32	7½	12	12½
Beverly	B	..	..	1	..	2	2	4	15	8	9	3	..	5	2	24	12	19	5½	9	2½
Beder Wood	B	4	..	4	9	11	2	..	..	6	9	1	8	1	..	28	12	31	8½	15	½
Barton's	P	1	..	..	13	6	2	4	..	9	4	3	14	2	2	27	3	24	2½	9	15½
Bubach	P	1	2	1	2	5	9	3	6	6	11	2	13	1	2	21	13	18	9	12	13
Captain Jack	B	..	..	3	6	7	8	..	..	10	9	7	12	2	5	31	8	17	5	16	2½
Clark's Early	B	..	..	1	2	4	7	3	4	2	..	..	..	..	..	10	13	11	5½	7	10½
Chairs	B	..	..	6	..	4	1	4	..	3	13	2	4	..	..	20	2	15	12	14	7½
Crescent	P	1	8	4	8	14	3	5	4	10	5	..	..	4	..	39	12	39	9	22	14½
Enhance	B	1	2	1	..	3	6	2	5	8	14	2	5	3	6	22	6	13	9½	11	4½
Equinox	B	..	..	..	..	..	..	1	6	3	13	3	4	3	9	12	..	17	4	9	6½
H. W. Becher	B	2	..	2	12	7	4	5	8	7	12	2	2	1	13	29	3	37	3	31	15
Haverland	P	..	..	1	2	5	9	..	..	9	7	3	6	3	1	22	9	22	8½	9	9
Jas. Vick	B	..	..	..	..	7	4	..	..	7	12	2	5	3	6	20	11	21	9	21	11½
John Little	B	2	4	3	6	8	1	..	..	7	12	2	5	1	2	24	14	22	3	17	2½
Leader	B	1	..	4	..	6	4	7	6	7	6	..	..	2	2	28	2	7	4	4	6½
Otsego	P	..	..	..	..	1	2	3	..	7	9	3	..	3	10	18	5	14	6½	10	13
Pearl	B	1	14	3	..	5	10	3	..	4	14	1	8	1	8	21	6	19	6	13	1½
Paris King	B	1	5	2	13	5	4	..	..	8	9	3	9	2	..	23	8	4	7½	7	11
Parker Earle	B	1	13	4	12	10	..	4	13	7	5	7	12	1	8	37	15	21	5	13	15½
Shirts	B	..	..	..	..	..	..	..	..	6	4	4	6	3	7	14	1	15	2	14	9
Sharpless	B	1	1	1	2	3	..	2	12	6	15	2	9	3	..	20	7	17	7	15	5
Swindle	B	..	..	1	2	3	2	2	10	4	2	4	8	3	12	19	4	28	8	10	7
Seneca Queen	B	..	13	1	5	6	2	5	..	7	4	2	3	1	15	24	10	17	14	4	2
Thompson's Late	P	4	1	4	12	3	5	..	..	1	15	..	..	..	..	14	1	9	15	2	2
Wm. Belt	B	..	..	1	2	..	..	1	8	3	..	1	8	1	8	8	10	14	4½	13	
Warfield No. 2	P	2	2	5	2	9	..	5	15	14	12	..	..	4	8	41	7	40	..	7	6½
Wilson	B	1	4	3	7	..	..	10	..	3	7	2	8	..	..	20	10	21	4	12	12
Williams	B	..	3	1	.	5	4	5	2	6	12	4	12	5	..	28	1	19	15½	13	12
Woolverton	B	2	5	4	..	12	4	..	..	11	15	5	2	1	9	37	3	21	14	2	15½
Lovett	B	1	2	2	5	8	..	6	..	4	13	3	8	2	4	28	..	35	13		
Mary	P	..	..	..	..	4	8	..	..	6	6	3	..	3	6	17	4	22	4		
Gandy	B	..	..	1	5	3	8	..	..	8	..	3	2	2	5	18	4	19	6		
Eureka	P	..	..	2	..	1	4	3	4	5	12	2	..	5	1	19	5	21	13		
Greenville	P	1	5	2	4	3	15	5	2	4	8	3	4	1	8	21	14	17	4	9	6½

EXPERIMENTS WITH STRAWBERRIES GROWN IN HILLS AND ROWS.

Name of Variety.	How Planted.	Date of Picking. July 11.		July 13.		July 17.		July 19.		July 23.		July 26.		July 30.		1900. Total yield from Plot 99 sq. ft.	
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Crescent	Rows	1	8	4	8	14	3	5	4	10	5	..	....	4	.	39	12
"	Hills	....	...	3	2	6	12	1	15	4	1	2	.	1	1	18	15
H. W. Becher	Rows	2	.	2	12	7	4	5	8	7	12	2	2	1	13	29	3
"	Hills	1	8	2	2	5	4	3	.	5	2	1	9	.	14	19	7
Bisel	Rows	.	9	1	12	3	12	4	2	9	8	6	6	2	12	28	13
"	Hills	....	....	2	4	6	.	3	15	6	8	4	14	2	4	25	13
Beder Wood	Rows	4	.	4	9	11	2	....	....	6	9	1	8	1	.	28	12
"	Hills	....	....	3	2	2	15	1	4	....	...	.	15	....	....	8	4

EXPERIMENTS WITH RASPBERRIES.

Ten varieties of raspberries are under test. These are set in rows 6 feet apart, and 33 feet long. Each plot is one row, 33 feet long. The canes are kept cut to cover a space of ground 1 foot wide along the entire row. They were planted in the spring of 1897. The soil is a heavy clay loam. The rows were manured in the fall of 1899, and the manure worked in the following spring.

These plots have, so far, only fruited lightly. The raspberry Anthracnose (*Gloesporium venetum*) has greatly troubled the raspberries here. It was imported on some canes of the black raspberry, and quickly spread. The canes that have fruited are cut out as soon after as possible. This, together with spraying with diluted Bordeaux mixture, i.e., 3 pounds copper sulphate, 3 pounds lime, to 40 gallons of water, has greatly reduced this disease. The old canes are sprayed in the early spring, before the leaves are opened ; the young canes, when 4 inches high, and after this for two sprayings, at intervals of two weeks. All of the sprayings after the first one should be directed to the young canes only, as it is of no value, but rather an injury, to the fruiting canes. Of course, necessarily, some Bordeaux will fall upon the old canes, but the work can be done so that the base of the old canes will only be touched with Bordeaux, and not the upper leaves. This work must be done early to be effective.

This disease has been noticed in many respberry plantations. The following points will enable one to detect it. The old canes are more or less blotched with dead tissue of a dark brownish colour. The fruit does not fill out well, and dries up. The leaves curl and fall prematurely. The young canes, when about 1 foot high, will appear more or less covered with small reddish-purple spots around the base. This quickly increases in size, the centre of the spots turn to a grayish-white, and the margin retains its purplish colour. As the growth continues, more small spots are noticed further up the cane. The leaves are also attacked by this fungus.

The yield from the raspberry plots during the past year has been as follows :—

Name of Variety.	Season of Picking.	Yield per Plot of 33 feet. Lbs.	Oz.
Red—			
Marlboro	July 21 to Aug. 16	30	14
Miller's Red	" 21 " 8	18	9
Loudon	" 21 " 8	19	
Turner	" 21 " 16	17	2
Cuthbert	" 28 " 16	16	
Hansell	" 21 " 3	11	12
White—			
Golden Queen	" 21 " 16	20	2
Black—			
Older	" 21 " 8	12	9
Purple—			
Columbian	" 21 " 8	11	15
Shaffer's Colossal	" 21 " 8	10	12

DESCRIPTION OF VARIETIES.

Cuthbert.—Canes strong, vigorous, quite hardy, and suckers freely. It produces fruit of large size, good quality, and firm. It is one of the best varieties, and for shipping purposes stands ahead of most others. The Marlboro is more prolific here, and fruits earlier. This variety follows as a later market sort.

Marlboro.—Vigorous growing canes, quite hardy and suckers freely. The fruit is large, firm, and of fair quality. This is a good early market sort, is a fine-looking fruit, and stands shipment well.

Loudon.—This variety is quite productive, growth vigorous ; fruit of medium size, and of good quality. Canes strong, quite hardy. Would probably stand shipping well.

Turner.—A strong vigorous grower, canes sucker freely. The fruit is of medium size, and of fair quality, but too soft for distant shipment. It is a very hardy sort, and succeeds where Cuthbert and Marlboro winter-kill.

Miller's Red.—A strong, vigorous grower, and quite productive. Fruit large, quality good, quite firm enough to ship well. Season about with the Marlboro'.

Hansell.—Growth fairly vigorous ; fruit soft, small, quality good. Has not done well here.

Older.—This is a vigorous-growing variety, producing large fruit of excellent quality. The fruit is firm, and stands shipment well. This is one of the best of the black-caps.

Columbian.—The canes are hardy, vigorous, and quite prolific. The fruit is very large, purple, of fair quality, and fairly firm. This fruit is of special value for canning purposes.

Shaffer's Colossal.—This is rather more vigorous than the Columbian. The fruit is large, and the quality fair. It is also firmer than the Columbian, and is valuable for canning.

Golden Queen.—A good yellow sort. The fruit is quite firm, and of good quality. and stands shipment fairly well. The canes are vigorous, quite hardy, and prolific. This variety, with Cuthbert, Marlboro, Shaffer's Colossal and Older, should be in every collection.

EXPERIMENTS WITH GARDEN PEASE.

Eighty-two varieties of garden pease were planted May 17, in rows 4 feet apart. There were two plots of each variety. One plot was pulled and the quantity of marketable green pease with pods weighed. The other was allowed to ripen and the quantity of ripened seed obtained. The seed was planted 1½ inches deep and 2 inches apart in the rows. Each plot was one row 66 feet long.

The land had tomatoes on it as a previous crop. It had no manure for that crop, but was manured the previous year for vegetables. It was ploughed in the fall of 1899 and worked up in the spring of 1900, with the spring-tooth harrow. Fertilizer at the rate of 150 pounds per acre was scattered along the rows, before the seed was planted, and worked in when covering the seed.

The Pea Aphis (*Nectarophora destructor*) was again troublesome. It appeared about July 29, but remained only a short time, and did not do nearly as much damage as it did last season.

The following yields were obtained, and notes taken of the character of growth :—

GARDEN PEASE—TEST OF VARIETIES.

Name of Variety.	Length of Vine.	Length of Pod.		Date when Pulled and Pounds of Marketable Pease with Pods, per Plot.				Total Yield of Marketable Pease, per Plot.	Yield of Ripened Seed per Plot.
	Inches.	Inches.			Lbs.		Lbs.	Lbs.	Lbs.
Sunol	31	2¼ to	2½	July 20,	10¾	July 28,	9¼	20	8½
Alaska	33	2¼	2½	" 20,	8¼	" 28,	5	13¼	5½
Station	34	2½	2¾	" 20,	10¾	" 28,	4¼	15	5¼
New Maud S.	40	2¼	2½	" 20,	6¼	" 28.	22½	28¾	8¼
Bergin Fleeting	36	2½	2¾	" 20,	7	" 28,	11¼	18¼	5
Gradus	18	3	3¾	" 20,	8½	" 28,	4	12½	4½
Nott's Excelsior	18	2½	2¾	" 20,	8½	" 28,	20¾	29¼	6¼
Extra Early Pioneer	32	2	2¾	" 20,	11¼	" 28,	12	23¼	8½
Philadelphia	36	2¼	2¾	" 20,	9½	" 28,	11¼	20¾	5
American Wonder	17	2½	2¾	" 20,	9¼	" 28,	10¾	20	6
Exonian	34	2½	2¾	" 20,	12½	" 23,	10¾	23¼	6½
Rural New Yorker	35	2¼	2½	" 20,	10¾	" 28,	15¾	26½	7¼
Gregory's Surprise	36	2¼	2¾	" 20,	15¼	" 28,	6¾	22	6¼
Cleveland's First and Best	36	2¼	2½	" 20,	14¼	" 28,	11¾	26	8¼
Thorburn's Early Market	34	2	2½	" 20,	12½	" 28,	14½	27	8½
Imp. Ex. Early Daniel O'Rourke	35	2	2½	" 20,	11¼	" 28,	17¾	29	8¼
Extra Early Star	36	2¼	2½	" 20,	16¾	" 28,	12	28¾	8¼
Tom Thumb	24	2¼	2¾	" 20,	8¼	" 28,	13	21¼	7¼
Ameer	40	3	3¼	" 20.	8½	" 28,	16½	25	6
S. B. & M. Co's Extra Early	36	2½	2¾	" 28,	14¾	Aug. 1,	9¼	24	7¼
Mill's First of All	40	2	2½	" 28,	15½	" 1,	4½	20	5¾
Chelsea	18	2¾	3	" 28,	16	" 1,	4¼	20¼	6¼
Dwarf Wrinkled Sugar	18	2½	2¾	" 28,	15¼	" 1,	7¾	23	6¼
Hancock	40	2½	3	" 28,	19½	" 1,	16½	36	6½
Early Dexter	28	2¼	2¾	" 28,	17¼	" 1,	15¾	33	7¾
Premium Gem	24	2½	3	" 28,	16	" 1,	21½	37½	8¾
Early Frame Improved	41	2½	3	" 28,	17¾	" 1,	16¼	34	8½
Early May Improved	45	2½	3	" 28,	16¼	" 4,	21¾	38	8¼
Early Kent	40	2½	3	" 28,	12¼	" 1,	11¾	24	8½
Blue Beauty	30	2½	3	Aug. 2,	11½	" 6,	23½	35	8¾
Simmer's First of All	41	2½	3	" 2,	23½	" 6,	11¼	34¾	6¼
Kentish Invicta	45	2	2½	" 2,	12	" 6,	16¼	28¼	9¾
Ringleader	36	2½	3	" 2,	16½	" 6,	8¼	24¾	7¾
Alpha	45	2¾	3	" 2,	13½	" 6,	14½	28	6½
Blue Peter	12	2½	2¾	" 2,	12¼	" 6,	11½	23¾	6¾
Carter's Up-to-Date	41	3½	4	" 2,	28½	" 6,	12½	41	7¼
Petit Pois or Small French	36	2½	3	" 2,	21½	" 6,	18	39½	6¾
McLean's Little Gem	34	2½	3	" 2,	22¼	" 6,	16	38¼	9½
Laxton's Alpha	36	2¾	3	" 9,	21½	" 15,	21	42½	8½
Dwarf Telephone	18	3	3½	" 9,	18½	" 15,	14¼	32¾	5¼
Stanley	40	3½	4	" 9,	26¼	" 15,	12½	38¾	10¼
New Giant Podded Marrowfat	30	3	4	" 9,	20¼	" 18,	18¾	39	9¼
Boston Wrinkled	35	2½	3	" 9,	20	" 18,	20¾	40¾	7¾
Profusion	36	2½	3	" 9.	20¼	" 18,	24½	44¾	9½
Admiral	36	2½	3	" 9,	26½	" 18,	13	39½	10
Melting Sugar or Edible Podded	46	2¾	3¼	" 9,	14½	" 18,	36½	51	12
Champion of England	46	2½	3¾	" 9,	17	" 18,	15½	32½	6¼
Horsford's Markets	31	2¾	3	" 9,	12½	" 18,	25½	38	9¼
Startler	30	2¼	2¾	" 9,	16½	" 18,	21½	38	5¼
Duke of Albany	46	3¼	4¼	" 9,	12½	" 18,	23½	36	13
Sutton's Satisfaction	46	2½	3	" 9,	16¾	" 18,	36½	53¼	11¾
Pride of the Market	20	2¾	3½	" 9,	17	" 18,	31½	48½	12
Abundance	34	2½	2¾	" 9,	19½	" 18,	26¾	46¼	10¾
Everbearing	33	2½	3	" 9,	13½	18,	14¾	28¼	6½
Sutton's Dwarf Defiance	18	2¾	3½	" 9,	16	" 18,	14½	30½	6½
Hair's Dwarf Mammoth	22	3¼	4	" 9,	16¼	" 18,	17¾	34¼	10
Daisy	24	2¾	3½	" 13,	22½	" 23,	22	44½	9¼
Burpee's Profusion	32	2½	3	" 13,	16	" 23,	25¾	41¾	5½
Prince of Wales	35	2¾	3¼	" 13,	33½	" 23,	23	56½	4¾
Duke of York	46	2¾	3½	" 13,	30	" 23,	22	52	7¾
Heroine	30	3½	4	" 13,	14½	" 23,	24	38½	9¼
Black-eyed Marrowfat	45	2¾	3	" 13,	20½	" 23,	36½	57	12¾
McLean's Prolific	30	3¼	4	" 13,	24	" 23,	24¾	48¾	9
Dwarf Champion of England	30	2¼	2¾	" 13,	14	" 23,	24	38	8¼

GARDEN PEASE—TEST OF VARIETIES.

Name of Variety.	Length of Vine.	Length of Pod.		Date when Pulled and Pounds of Marketable Pease with Pods, per Plot.				Total Yield of Marketable Pease, per Plot.	Yield of Ripened Seed per Plot.
	Inches.	Inches.			Lbs.		Lbs.	Lbs.	Lbs.
Eugenie	45	2½	3	Aug. 13,	23¾	Aug. 23,	29½	53¼	11
900 to 1	48	2¼	3	〃 13,	23	〃 23,	18½	41½	12
Juno	30	2½	3¼	〃 13,	20	〃 23,	35½	55½	8¼
Queen	44	3	4	〃 13,	12¼	〃 23,	16½	28¾	4½
Grant's Favourite	46	2½	2¾	〃 13,	12½	〃 23,	36½	49	12
Anticipation	35	2¾	3½	〃 13,	22½	〃 23,	30½	53	7¼
Forty-fold	48	2¾	3	〃 13,	20	〃 23,	36½	56½	13
King of the Dwarfs	22	2½	3	〃 13,	24	〃 23,	6¾	30¾	6¼
Telegraph	46	2¾	3½	〃 13,	20¼	〃 23,	16¼	36½	12
Pride	36	2¼	2¾	〃 13,	16¼	〃 23,	19¼	35½	10
Scheriezer's Giant	42	3	4	〃 18,	12¼	〃 25,	36	48¼	9
Sharp's Queen	46	2¾	3½	〃 18,	12½	〃 25,	35¾	48¼	4½
Shropshire Hero	33	2½	3¼	〃 18,	23¼	〃 25,	16½	39¾	7½
New Victory	36	3	3½	〃 18,	4¼	〃 25,	40	44¼	6¾
Scimitar	47	3	3¾	〃 18,	5¾	〃 25,	32½	38¼	9½
Veitch's Perfection	48	2¾	3½	〃 18,	4½	〃 25.	33¼	37¾	8¾
Sander's Marrow	46	3	3½	〃 18,	3½	〃 25,	34½	38	6¼
Early Britain	48	2¼	3½	〃 18,	8½	〃 25,	25½	34	7½

EXPERIMENTS WITH BEANS.

Twenty-seven varieties of beans were planted June 19, in rows 3 feet apart. Each plot was one row 66 feet long, and two plots of each sort were sown. One plot was pulled to obtain the weight of green marketable beans, and the other was left to ripen. The seed was planted on level ground in drills made 1½ inches deep and placed 2 inches apart.

The land was previously in vegetables, and having been manured for that crop, no fertilizer was applied for the beans. The land was ploughed in the fall and worked up the following spring with the disc and spring-tooth harrows, before seeding.

The different varieties were all more or less affected with the bean anthracnose or pod-spot, which greatly injured the crop. The varieties Keeney's Rustless Wax, and Extra Early Red Valentine, were most free from this disease.

BEANS—TEST OF VARIETIES.

Name of Variety.	Date when pulled for use and pounds of edible Beans per plot.				Length of Pod.	Colour of Pod.	Rusted.	Yield of seed per plot.		How Matured.
	Lbs.	Oz.	Lbs.	Oz.	Inches.			Lbs.	Oz.	
	Aug. 8.		Aug. 15.							
Flageolet Scarlet Wax	7	8	12	5	5 to 6	Yellow	Badly	4	8	Poor.
Dwarf German Black Wax	16	2	14	9	4 " 5	"	Slightly	8	4	Good.
Long Yellow Six Weeks	15	5	12	14	5 " 6	Green	Badly	10	9	"
Early Giant Wax or Butter	12	10	23	10	5 " 6	Yellow	Considerably	6	14	"
Early Mohawk	10		11	4	$4\frac{1}{2}$ " $5\frac{3}{4}$	Green	None	12		Fair.
Dun Colour	13	9	7	13	$4\frac{1}{2}$ " $5\frac{1}{2}$	"	Badly	7	8	Good.
Early China	7		14	4	$4\frac{1}{2}$ " 5	"	"	9		Fair.
Mammoth Red German Wax	12	2	14	3	5 " 6	Yellow	Slightly	5	13	"
Improved Rust-proof Golden Wax	8	8	13	8	$3\frac{1}{2}$ " 4	"	Considerably	5	14	"
Detroit Wax	8	2	12	2	4 " 5	"	"	9	9	"
Crystal White Wax	15	10	24	7	5 " 6	"	Slightly	10	8	"
Wardwell's Kidney Wax	10	4	9	14	4 " 5	"	"	7	5	Good.
	Aug. 15.		Aug. 21.							
Royal Dwarf Kidney	23	8	13	13	$4\frac{1}{2}$ " $5\frac{1}{2}$	Green	Considerably	8	9	Fair.
Taber's I X L	18		21	9	5 " 6	"	"	8		"
Extra Early Red Valentine	14	2	14	5	$4\frac{1}{2}$ " 5	"	None	10	5	"
Dwarf Bush Stringless	8	9	15	8	$5\frac{1}{2}$ " $6\frac{1}{2}$	"	Considerably	9	2	Good.
Early Large Marrowfat	6	2	10	7	$4\frac{1}{2}$ " 5	"	"	5	13	Fair.
Dwarf Bush Golden Wax	12	2	20		$3\frac{1}{2}$ " $4\frac{1}{2}$	Yellow	Badly	6	8	Poor.
Canadian Wonder	8	8	17	8	$5\frac{1}{2}$ " $6\frac{1}{2}$	Green	Considerably	7	4	"
Black-Eyed Wax	4	3	14	7	$3\frac{1}{2}$ " $4\frac{3}{4}$	Yellow	Badly	4	4	"
Keeney's Rustless Wax	8	8	23	9	$3\frac{1}{2}$ " $4\frac{3}{4}$	"	None	10	9	Fair.
	Aug. 21.		Aug. 31.							
Mammoth Wax	8	4	12	2	4 " 5	"	Badly	3	13	Poor.
Yosemite Wax	3	2	13	9	4 " $5\frac{1}{2}$	"	"	4	9	"
Speckled Wax	6	7	12		5 " 6	"	"	7	4	Fair.
Early Refugee or 1,000 to 1	3	9	42	5	3 " 4	Green	Slightly	12	2	Poor.
Roger's Lima Wax	6	9	13	6	$3\frac{1}{2}$ " 4	Yellow	Considerably	4	6	"
Cylinder Ivory Podded Wax	5	7	11	7	$3\frac{1}{2}$ " $4\frac{1}{2}$	"	Badly	7	5	"
Giant Dwarf Wax Red seeded	15	2	21		5 " 6	"	Considerably	9	2	Fair.

EXPERIMENTS WITH BEANS IN HILLS AND ROWS.

As stated in my last annual report, the practice of growing beans in hills is supposed by some to hasten the crop of marketable green beans. To obtain further information on this point, nine varieties were grown in hills 2 feet apart, 3 feet apart, and in rows. The yield, as given below of each plot, is from one row 66 feet long.

There was no apparent difference in the time when the beans in rows and hills were ready for market. The yields did not indicate that one system was better than the other, and the total yield of marketable green beans per plot only is given. The yield of ripened seed from a duplicate plot is also given. The land was cultivated and fertilized the same as the other bean plots. The soil was a heavy clay loam.

Beans—Test of Varieties in Hills and Rows.

Name of Variety.	Hills 2 feet apart.				Hills 3 feet apart.				Rows			
	Yield of Edible Marketable Beans per plot.		Yield of Harvested Seed per plot.		Yield of Edible Marketable Beans per plot.		Yield of Harvested Seed per plot.		Yield of Edible Marketable Beans per plot.		Yield of Harvested Seed per plot.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Dwarf German Black Wax......	32	2	7	9	48	9	8	....	30	5	8	6
Early Six Weeks...............	37	13	8	9	37	13	10	8	28	11	9	2
Mammoth Red German Wax...	26	9	4	12	16	8	3	9	26	4	4	7
Rust-proof Golden Wax	20	5	6	6	24	....	6	5	22	6	5	9
Early Mohawk.......	26	....	5	5	20	8	7	....	20	4	6	6
Extra Early Red Valentine.....	35	2	6	13	35	13	7	9	28	9	7	....
Detroit Wax	14	12	7	8	12	10	9	...	16	....	8	8
Keeney's Rustless Wax.........	34	...	11	9	30	8	13	2	32	4	9	8
Early Large White Marrowfat..	12	9	6	2	20	....	8	9	16	8	9	4

EXPERIMENTS WITH TOMATOES.

Fifty-three varieties of tomatoes were grown, and each plot was made up of six plants, set 4 feet apart each way. On August 30 what fruit had ripened was picked and weighed. The fruit that ripened subsequently was picked and weighed early in September, and on the 15th of the month all the fruit was picked and weighed. The total yield of ripe and green fruit obtained is given in the appended table.

The soil of these plots had no manure the two previous years, and was manured with 25 one-horse cartloads of stable manure per acre in the spring of 1900, and ploughed under, after which the land was worked up and the plants set. One handful of nitrate of soda was scattered around each plant after they had got nicely started, which gave the plants a good vigorous growth.

The seed was sown in a hot-bed March 26. The plants were thinned to one inch apart as soon as they were large enough, and removed to another hot-bed April 19, each plant being set in a strawberry fruit box full of good earth. These were placed in the hot-bed, where they remained until removed to the open ground, June 1. The plants when put out were from six to eight inches high. Very thrifty and stocky.

The hot-bed was well ventilated so that a thrifty growth was obtained. The earth in the boxes was thoroughly wet before the plants were put out, and the sides of each box were cut so that the earth and roots would not be disturbed. The plants treated in this way suffered no check whatever and made splendid growth and gave a good yield of ripened fruit.

TOMATOES—TEST OF VARIETIES.

Name of Variety.	Character of Fruit.	Size of Fruit	Yield of Ripe Fruit from 6 hills, Aug. 30.		Total Yield from Six Plants.					
					Ripe.		Green.		Total.	
			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Earliest of all	Irregular	Small	5	..	32	2	15	4	47	6
Extra Early Jersey	"	Medium	2	..	55	9	68	..	123	9
Mitchell's No. 1	Medium, smooth	Large	1	15	20	12	48	9	69	5
Canada Victor	Irregular	"	1	15	29	9	56	3	85	12
Early Bird	Round, smooth	Medium	1	13	37	4	58	7	95	11
Creekside Glory	Medium, smooth	Large	1	13	24	1	54	2	78	3
Long Red Perfection	Smooth	"	1	12	15	15	76	15	92	14
Freedom	Round, smooth	Medium	1	11	32	11	40	2	72	13
Early Richmond	Irregular	Large	1	11	52	13	50	1	102	14
Lorillard	Round, smooth	"	1	9	12	2	32	7	44	9
Democrat	"	"	1	8	11	2	31	6	42	8
Royal Red	Smooth	"	1	6	16	9	48	..	64	9
Early Bermuda	Irregular	"	1	5	29	3	39	2	68	5
Livingston's Magnus	Smooth	Very large	1	2	19	8	46	13	66	5
Fordhook's First	"	Large	1	..	23	4	61	8	84	12
Conference	Round, smooth	Medium	..	15	17	9	40	2	57	11
Table Queen	Smooth	Large	..	14	22	5	61	2	83	7
Livingston's Beauty	"	Medium	..	13	20	..	44	15	64	15
Bond's Early Minnesota	Round, smooth	"	..	13	15	8	43	..	58	8
Atlantic Prize	Smooth	Large	..	12	32	..	49	4	81	4
Early Ruby	Medium, smooth	Medium	..	9	36	4	52	4	88	8
Waldorf	Round, smooth	Small	..	7	32	7	53	15	86	6
Volunteer	Smooth	Large	..	3	12	4	48	15	61	3
Thorburn's Long Keeper	"	"	..	3	28	2	64	..	92	2
Golden Queen	"	"	..	2	22	8	51	..	73	8
Mikado	Round, smooth	Medium	..	2	20	7	42	6	62	13
Dwarf Champion	"	"	..	2	11	7	28	14	40	5
Improved Trophy	"	Large	..	2	12	1	30	8	42	9
Potato Leaf	Smooth	"	..	2	14	2	38	5	52	7
Optimus	"	"	..	2	14	12	70	15	85	11
Ignotum	"	"	..	2	13	2	54	15	68	1
Money Maker	Medium, smooth	"	..	..	28	4	63	2	91	6
New Stone	Smooth	"	..	..	18	1	38	1	56	2
Autocrat	"	"	..	..	18	1	39	2	57	3
Early Conqueror	Medium, smooth	"	..	..	18	1	52	12	70	13
Maule's New Imperial	Smooth	"	..	..	17	2	68	15	86	1
Acme	"	"	..	..	17	2	64	.	81	2
Matchless	"	Very large	..	..	16	..	30	..	46	..
Enormous	"	Large	..	..	15	4	49	3	64	7
Crimson Cushion	Medium, smooth	"	..	..	15	2	46	9	61	11
Buckeye State	Smooth	"	..	..	12	6	38	15	51	5
Imperial	Medium, smooth	"	..	..	12	6	36	8	48	14
Ponderosa	Round, smooth	"	..	..	9	12	36	13	46	9
Baltimore Prize Taker	Smooth	Medium	..	..	9	..	53	15	62	15
Favourite	"	Large	..	..	9	..	33	..	42	..
Yellow Plum	"	Small	..	..	7	8	32	15	40	7
Red Peach	"	"	..	..	7	7	15	11	23	2
Pear Shaped Yellow	"	"	..	..	7	4	31	2	38	6
Potomac	Round, smooth	Medium	..	..	7	..	31	3	38	3
New Yellow Peach	Smooth	Small	..	..	7	..	24	2	31	2
Essex Hybrid	"	Medium	..	..	6	6	42	15	49	5
Comrade	Round, smooth	"	..	..	6	2	60	5	66	7
Honour Bright	Smooth	Large	..	..	4	..	45	2	49	2

EXPERIMENTS WITH CAULIFLOWERS.

Twelve varieties of cauliflower were started in the hot-bed, April 11, in rows, 4 inches apart. These were thinned to one inch apart in the rows, April 21. The plants were given good ventilation and grew thrifty and stocky. They were set in the open ground June 2 ; made very good growth and some splendid heads were obtained.

The land was a clay loam, which was in strawberries the previous season. These were ploughed under in the fall and the land worked up the following spring. No manure was used but complete fertilizer at the rate of 800 pounds per acre was sown broadcast and harrowed in as stated in the potato experiments. The rows were run 24 inches apart, raked off and the plants set.

Weights were obtained of the early plots as given in the table, but of the later sorts which headed after August 24 no weights were obtained.

CAULIFLOWERS—TEST OF VARIETIES.

Name of Variety.	Number of Plants Set.	Plants that Died or did not Mature Heads.	Matured Heads, when Cut, and Weights. July 19.		July 25.		Aug. 3.		Aug. 9.		Aug. 16.		Aug. 24.		Total Weight of Matured Heads.		How Headed and Character of Growth.
			Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	
Early Snowball	18	7	5	2¼	1	¾	...	...	2	3¼	2	6½	1	3	11	15¾	Fine compact heads, not vigorous.
Gilt Edge	18	3	2	2	1	¾	2	2¾	4	6¼	3	8½	3	6½	15	26¾	" " " vigorous.
Thorburn's Denmark	18	1	3	2	5	3½	...	...	4	9¾	2	6	3	8½	17	29¾	Very fine large compact heads, vigorous.
Extra Early Dwarf Erfurt	18	4	6	2½	3	1¾	...	...	2	1½	3	8	...	...	14	13¾	Fine compact heads, fairly vigorous.
Large Early Dwarf Erfurt	18	6	2	1¼	3	2	...	...	3	6¾	3	8½	1	3½	12	22	Very fine large compact heads, vigorous.
Thorburn's Nonpareil	18	1	2	1	4	3½	2	2¾	3	6¼	3	8	3	5½	17	27	" " " " very vigorous.
Lenormand's Short Stem	18	...	...	...	5	3¾	8	6¼	4	5	1	1¼	...	...	18	16¼	Heads not compact, poor, vigorous.
Early London	18	1	...	...	...	...	...	...	3	6½	...	...	2	4½	5	11	Heads compact and good, vigorous.
Extra Early Paris	18	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Heads fair, vigorous.
Early Walcheren	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Heads poor, no value, vigorous.
Autumn Giant	18	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Heads compact, good, vigorous.
Large Late Algiers	18	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	" " " "

EXPERIMENTS WITH GARDEN CORN.

Experiments were conducted with twelve varieties of garden corn, which were planted in hills 3 feet apart each way on May 30. The land was previously in beans and was manured in the spring of 1900 with 25 one-horse cart-loads of stable manure per acre, which was ploughed under and worked up. The plots made slow early growth. Each plot was one row 66 feet long. The yields of marketable ears are given in the following table. The crop was cut September 15.

This is the first year that the variety 'New Champion' has been grown here, and it appears from the test that it is a promising sort.

GARDEN CORN—TEST OF VARIETIES.

Name of Variety.	Number of Ears Fit for Market.	Size of Ears.	Condition for Use.
Early White Cory	163	Medium	Good
Crosby's Early	142	"	"
New Champion	122	Large	"
Perry's Hybrid	32	"	"
Nonesuch	30	"	"
Hickox Improved	28	"	"
Old Colony	23	Fair	"
Moore's Early Concord	12	Large	Fair
Kendall's Early Giant	8	"	"
Country Gentleman	....	....	Not fit
Stowell's Evergreen	....	....	"
Zig-zag Evergreen	....	....	"

SOAKING GARDEN CORN SEED TO HASTEN GROWTH.

To gain information as to the value of soaking corn before planting, an experiment was tried by soaking the seed of four varieties in warm water for twelve hours before planting. Duplicate plots were planted alongside which were not soaked. The seed was planted in hills 3 feet apart May 31.

There was no apparent difference in the growth of the plants from the seed soaked and not soaked, and judging from two years experiments along this line, it would appear that there is no gain whatever in soaking the seed. The crop was cut September 15. The following numbers of ears were obtained from the plots, each being one row, 66 feet long :—

GARDEN CORN--SOAKED AND NOT SOAKED.

Name of Variety.	Row Soaked. — Number of Ears.	Row Not Soaked. — Number of Ears.
Early White Cory	142	136
Crosby's Early	153	162
Perry's Hybrid	41	46
Nonesuch	25	23

BARN-YARD MANURE COMPARED WITH COMMERCIAL FERTILIZERS ON EARLY POTATOES.

Nine varieties of potatoes were selected as among the most promising early sorts, and the object of the experiment was to learn which ones would produce the most early marketable tubers ; also, to determine the value of stable manure compared with commercial fertilizers for producing an early crop.

Well rotted stable manure, at the rate of twenty-five one-horse cart-loads per acre, was spread on the land in the fall after it was ploughed. The previous crop was strawberries, the plants having been ploughed under. One end of the field, a strip 68 feet long, was manured, and the balance was fertilized with chemical potato fertilizer, at the rate of 800 pounds per acre.

The land was worked up in the spring by ploughing and the spring-tooth harrow, after which the fertilizer was sown and harrowed in by the smoothing harrow. The land was drilled into rows, 24 inches apart, and the seed planted one foot apart in the rows, and covered with the plough. The potatoes were cut so that each piece contained from two to three eyes.

The size of a plot was one row, 66 feet long. The yield of marketable and unmarketable potatoes on a part of the field which was fertilized only, and dug August 10 is given ; also, the yield from both manured and fertilized plots dug August 24 is given. The seed was planted May 30. The variety Irish Cobbler is a white potato, with rather deep eyes. Burpee's Extra Early, Bovee, Pearce's Extra Early, Early Six Weeks and Crown Jewel are pinkish-white sorts, the others are rose colour. These varieties are all of excellent quality :—

EXPERIMENTS WITH EARLY POTATOES, WITH BARN-YARD MANURE AND ARTIFICIAL FERTILIZER.

Name of Variety.	Fertilized.		Fertilized.		Manured.	
	Dug Aug. 10.		Dug Aug. 24.		Dug Aug. 24.	
	Marketable.	Not Marketable.	Marketable.	Not Marketable.	Marketable.	Not Marketable.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Burpee's Extra Early	28½	4½	57	7½	64½	9
Irish Cobbler	40½	6	52½	9	66	10½
Bovee	36	12	39	10½	60	9¾
Pearce's Extra Early	27	4½	37½	6	42	4¼
Early Gem	33	8¼	52½	10½	70½	9
Early Six Weeks	33	6	39	6	61½	9
Early Sunrise	33	9	37½	7¼	57	7½
Early Ohio	30	9	45¾	6	56¼	6
Crown Jewel	42	8½	58½	4½	66	7½

EXPERIMENTS WITH BORDEAUX MIXTURE AS A PREVENTIVE OF ROT IN POTATOES.

A strip of land on which nine varieties were grown was thoroughly sprayed July 27, August 7, 17 and 27 ; a strip adjoining on which the same sorts were growing was left unsprayed.

The piece of land on which these potatoes were grown received the same treatment as far as cultivation and fertilizing, all having received only potato fertilizer. The land was worked up as stated in the other potato tests. The soil was as even as it was possible to get it.

The plants sprayed remained green and were practically free from rot. Those not sprayed blighted badly.

In order to be effective with this mixture the work must be thoroughly done. The plants must be well covered, and this can only be done by having a good spraying outfit. If heavy rains wash the mixture off, they should be again sprayed, as only by keeping the plants coated with the solution will the blight spores be killed.

The rows were 24 inches apart, and the seed was dropped 1 foot apart in the rows, each piece having from two to three eyes. Ten feet of space was left between the treated and untreated plots. The seed was planted May 30, and the crop dug September 21. The plots were each one row, 66 feet long :—

EXPERIMENTS WITH BORDEAUX MIXTURE AS A PREVENTIVE OF ROT IN POTATOES.

Name of Variety.	Not Sprayed.			Sprayed.		
	Marketable.	Not Marketable.	Rotten.	Marketable.	Not Marketable.	Rotten.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Burpee's Extra Early	43½	12	30	52½	22½	3
Irish Cobbler	55½	13½	40½	54	15	
Bovee	28½	13½	31½	52½	16½	
Pearce's Extra Early	25½	12	31½	43½	10½	3
Early Gem	60	19½	22½	64½	10½	
Early Six Weeks	16½	7½	39	43½	6	
Early Sunrise	28½	13½	31½	52½	12	
Early Ohio	37½	4½	37½	43½	9	3
Crown Jewel	37½	7½	31½	54	7½	9

AGRICULTURAL MEETINGS.

I attended the annual meeting of the Nova Scotia Fruit Growers' Association, at Wolfville, N.S., on January 30 and 31. I also addressed agricultural meetings at the following places :—

January 15.—St. John, N.B.
February 20.—Upper Jemseg, N.B.
" 21.—Gagetown, N.B.
" 22.—Shannon, N.B.
" 23.—Jerusalem, N.B.
" 24.—Olinville, N.B.
" 26.—Welsford, N.B.

I have the honour to be, sir,
Your obedient servant,

W. S. BLAIR,
Horticulturist.

Brandon, Man. Part of herd on brome aftermath.

Avenue of Manitoba Maples leading to barn on Experimental Farm at Brandon, Man.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

BRANDON, MAN., November 30, 1900.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my thirteenth annual report, with details of the experiments undertaken and work accomplished on the Brandon Experimental Farm during the past year.

Viewed from an agricultural standpoint, the past season has been one of the most disastrous in the history of the province.

The spring opened up about the average date, and seeding commenced on this farm April 5.

As very little snow fell during the winter, the soil even on summer-fallow was very loose for several inches below the surface, and by April 25 this loose soil commenced to drift with the wind, cutting off all young growth and forming in some instances ridges of soil on the boundaries of the fields several feet high.

Owing to the abundance of vegetable fiber in the soil of the grain fields on the experimental farm, there was very little injury from this cause, but in the fruit plantations where it was unadvisable to grow grass, the top soil was in some cases stripped to a depth of six inches and piled up around the borders three feet deep.

There was 18 degrees of frost on May 2, cutting back the early sown wheat. This was followed by 8 degrees of frost on June 8. The injury from this last frost was very serious, all tender vegetation being cut even with the ground and in some instances oats and garden vegetables were completely killed; nearly all the fruit blossoms were also ruined and the young plums were frozen to the pit.

The injurious effects of these frosts was greatly increased by the drought prevailing at the time ; for it is found that a heavy rain directly after a frost materially assists vegetation to recover from the shock.

There was an almost total absence of rain during the spring months, only 57 100th inches fell between April 1 and June 25. This greatly retarded all vegetation, and many small seeds such as roots lay dormant in the ground for over a month.

The first heavy rain fell on June 26, and after that date growth was rapid, but the rain came too late to save the cultivated hay crop, which proved almost a failure ; early sown wheat was also too far advanced to receive much benefit, but oats and barley were greatly benefited and promised a very fair yield.

As if to compensate for the severe drought of spring, very heavy and constant rains set in after the first week in August, greatly interfering with harvest operations, hail-storms were also very general in nearly all parts of the province. The experimental farm was visited by a severe hail-storm accompanied by heavy rain on August

17. Very little harvesting was done at the time, and the standing grain was badly threshed out, in some instances thirty or forty bushels of oats per acre were shed on the ground. Fortunately, the hail-storm only struck the northern part of the farm.

The remainder of August was very wet, rain falling more or less nearly every day, making it very difficult to work the binders, and causing much of the grain to sprout in the stook, this, with the bleaching from rain, injured the quality of all sorts of grain.

As the first severe autumn frost did not occur until September 17, there was no injury from this cause in the latter part of the season.

EXPERIMENTS WITH SPRING WHEAT.

As a result of the unfavourable conditions previously mentioned, the yield of wheat has been very disappointing, and from an experimental standpoint, the result has been even more unsatisfactory, for instance on the date of the hail-storm, a large number of the early varieties were ready to cut, and in fact should have been harvested two days previous, had the weather been favourable; when these varieties were struck by hail they shelled out badly, while the late tight-chaffed varieties, such as Goose wheat, were very little injured by hail.

Then again, uneven germination in the spring, and delay in harvesting caused by rain in August, was far more injurious to some varieties than to others, for this reason the returns from this year's uniform trial plots cannot be considered a fair test of the comparative productiveness of the different varieties ; the results, however, are given simply as a matter of information.

The importance of selecting the most suitable kind of stook for wheat was emphasized this year. While the large round compact stooks stood up well and protected the inner sheaves from bleaching ; such stooks were invariably badly sprouted. The most satisfactory form of stook on this farm was composed of ten sheaves, six of them being placed opposite each other, and the remaining four set outside of the six, so as to break the joints. This form of stook was firm and dried out quickly.

The land was summer-fallowed the previous year, the uniform trial plots were one-twentieth of an acre each, and the soil was a sandy loam. All the varieties, fifty in number, were sown on April 18.

Spring Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Goose	August 20	128	28	Weak	2	Bearded	4,010	31	30	60	Considerably
2	Beaudry	" 20	124	29	Stiff	2	"	2,840	29	20	60½	Slightly.
3	Dions	" 20	124	33	Fair	3	"	3,300	26	40	59	"
4	Rio Grande	" 21	125	32	Stiff	3	"	2,550	25	50	59½	"
5	Beauty	" 20	124	29	"	3	Beardless	2,420	24	40	58	"
6	Wellman's Fife	" 20	124	32	"	3	"	2,340	24	20	57½	"
7	Laurel	" 20	124	35	"	3	"	2,660	24	00	57	"
8	White Connell	" 22	126	30	"	3	"	2,670	23	50	58	None.
9	Monarch	" 20	124	30	"	3	"	2,480	23	40	58	Slightly.
10	Rideau	" 20	124	28	"	2½	"	2,410	23	10	56	"
11	Roumanian	" 21	125	33	Fair	2	Bearded	2,720	23	..	60	"
12	Bluestem	" 20	124	36	Stiff	3¼	Beardless	2,820	23	..	56	None.
13	White Russian	" 20	124	30	"	3	"	2,725	22	55	57	Slightly.
14	White Fife	" 20	124	30	"	3	"	2,350	22	30	57	"
15	Red Fern	" 20	124	28	"	2	Bearded	2,280	22	..	58	"
16	Pringle's Champlain	" 20	124	25	Fair	2½	"	2,310	21	30	57	Considerably
17	Red Fife	" 21	125	30	Stiff	2¾	Beardless	2,530	21	20	57	Slightly.
18	Clyde	" 19	123	34	Fair	3	"	2,540	21	..	58	"
19	Red Swedish	" 19	123	36	"	3	Bearded	2,344	21	..	59	"
20	Percy	" 19	123	29	Stiff	2½	Beardless	2,340	21	..	57	"
21	Alpha	" 20	124	26	"	2¼	"	2,740	21	.	58	"
22	Countess	" 19	123	29	"	3	"	2,350	20	50	58	"
23	Dufferin	" 18	122	31	"	3	Bearded	2,150	20	50	58	"
24	Weldon	" 20	124	32	Fair	2½	Beardless	2,766	20	40	58½	"
25	Campbell's White Chaff	" 20	124	27	Stiff	2½	"	2,180	20	20	58	"
26	Stanley	" 18	122	32	"	2½	"	2,090	20	10	57½	"
27	Admiral	" 20	124	30	"	3	"	2,920	19	40	57	None.
28	Captor	" 20	124	31	"	2½	"	2,420	19	40	58	Slightly.
29	Progress	" 18	122	28	"	2½	"	2,130	19	30	58	"
30	Herisson Bearded	" 19	123	28	Fair	1½	Bearded	2,700	18	20	58	Badly.
31	Hungarian	" 18	122	25	Stiff	2	"	1,670	17	10	58	Considerably
32	Preston	" 18	122	32	"	2½	"	1,980	17	..	58	"
33	Crown	" 18	122	28	"	2½	"	1,690	16	50	57	Slightly.
34	Blenheim	" 21	125	34	"	3	"	2,595	16	45	55	"
35	Vernon	" 19	123	28	Fair	2¼	"	2,320	16	20	58	Badly.
36	Huron	" 18	122	30	Stiff	2	"	2,660	15	40	58	Slightly.
37	Advance	" 19	123	31	"	2½	"	2,500	15	..	57	"
38	Crawford	" 17	121	25	Fair	2¼	Beardless	2,100	15	..	57	Considerably
39	Mason	" 18	122	26	Stiff	2¼	"	1,910	14	50	57½	"
40	Blair	" 18	122	26	"	3	"	2,010	14	50	57	Slightly.
41	Ebert	" 17	121	26	Weak	2½	"	2,020	14	40	58	"
42	Colorado	" 18	122	29	Stiff	2½	Bearded	1,760	14	..	55	"
43	Dawn	" 18	122	22	"	2½	Beardless	1,470	13	50	58	Badly.
44	Byron	" 17	121	26	"	2½	Bearded	1,480	13	40	58	Slightly.
45	Norval	" 16	120	28	Fair	2½	"	2,100	13	20	57	Considerably
46	Early Riga	" 15	119	25	V. weak	2	Beardless	1,220	11	20	56½	Badly.
47	Fraser	" 16	120	26	Stiff	2½	Bearded	1,930	11	10	58	Considerably
48	Ladoga	" 18	122	30	Fair	2¼	"	2,270	10	30	56	"
49	Plumper	" 16	120	26	Stiff	2½	"	1,480	10	20	57½	"
50	Harold	" 18	122	26	Weak	2	"	1,600	8	20	57	Badly.

FIELD PLOTS OF SPRING WHEAT.

All sown on summer-fallow, soil, clay loam.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Yield per Acre.	
	Acres.				Inches.	Bush.	Lbs.
Preston	5	April 10	Aug. 8	120	36	26	24
Advance	1	" 10	" 10	122	36	17	33
White Connell	2	" 12	" 15	125	31	30	
Ladoga	1	" 12	" 14	124	31	20	30
Monarch	1	" 6	" 12	128	31	42	30
White Fife	2¾	" 6	" 14	130	33	40	21
Red Fife	3	" 6	" 15	131	31	45	50
Stanley	3	" 6	" 10	126	36	34	40
Percy	3	" 6	" 11	127	36	38	40

SELECTED AND UNSELECTED SEEDS.

During the harvest season of 1899 the largest heads were selected from the standing grain of some of the uniform tests plots of wheat and barley; these heads were threshed out and the grain sown for a comparison with unselected grain from the same plot.

The accompanying tables give the result. Owing to unexpected loss in cleaning only one-fortieth acre plots of the selected wheat were sown. The barley plots were all one-twentieth acre each. The soil was a sandy loam, summer-fallowed. The plots of wheat were sown on April 18 and 19, and those of the barley on May 17 and 18.

SPRING WHEAT.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
White Fife, selected	Aug. 22	125	30	Stiff	3	Beardless	2,300	25		56
" " unselected	" 20	124	30	"	3	"	2,350	22	30	57
Wellman's Fife, selected	" 22	125	31	"	3	"	1,240	22	40	57
" " unselect'd	" 20	124	32	"	3	"	2,340	24	20	57½
Red Fife, selected	" 22	125	31	"	2½	"	2,060	19		57
" " unselected	" 21	125	30	"	2¾	"	2,530	21	20	57
Preston, selected	" 19	122	31	Fair	2½	Bearded	2,280	18	40	55
" unselected	" 18	122	32	Stiff	2½	"	1,980	17		58
Admiral, selected	" 19	122	29	"	3	Beardless	2,080	15	20	53½
" unselected	" 20	124	30	"	3	"	2,920	19	40	57

BARLEY.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	May	Aug.		Inches.		Inch's		Lbs.	Bush.	Lbs.	Lbs.
Odessa, selected............	17	24	99	34	Fair..	2	6 rowed	1,810	41	22	46
" unselected.........	17	24	99	28	" .	2½	6 "	2,210	42	34	47
Common, selected..........	17	22	97	37	" .	3	6 "	1,500	33	16	45
" unselected.......	17	22	97	36	" .	3	6 "	1,670	29	38	45½
		Sept.									
Canadian Thorpe, selected..	18	8	112	32	Stiff..	3	2 "	3,490	27	14	46
" " unselected	18	8	112	33	" .	3½	2 "	2,950	34	18	47½

DIFFERENT METHODS OF PREPARING LAND FOR SPRING WHEAT.

As is usual on the experimental farm much better returns of wheat was obtained after a leguminous crop than when following either wheat or oats.

The size of the plots in this experiment was one-twentieth acre, the soil a clay loam, and the date of sowing was April 24.

Name of Variety.	Previous Crop.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
		Aug.		Inch's		Inch's		Lbs.	Bush.	Lbs.	Lbs
Wheat, Red Fife...	Summer fallow......	21	119	28	Stiff..	3	Beardless.	3,290	21	50	58
" " ..	Soja Beans	21	119	23	" .	2	" .	2,640	17	40	58
" " ..	Horse Beans........	21	119	29	" .	3	" .	2,490	16	50	58
" " ..	Pease...............	21	119	27	" .	2	" .	2,690	16	50	56
" " ..	Stubble, not plowed.	21	119	28	" .	2	" .	1,730	11	10	58
" " ..	Wheat..............	21	119	28	" .	3	" .	1,180	10	20	58
" " ..	Oats....	21	119	22	"	2	" .	1,380	8	40	55

EXPERIMENT WITH SPELTZ WHEAT.

This variety of spring wheat is attracting some attention in western Canada at present. It differs from the ordinary wheat of commerce in that its chaff is adherent and cannot be separated from the kernel by the ordinary threshing machine. It is said that machines are in use in Europe, capable of separating the chaff from the kernel, but in this country both are ground together and the product used for cattle and pig fed.

The straw is finer than that from other wheat but its feeding value has not been tested on the experimental farm.

The sample grown on the farm weighed about 40 pounds to the measured bushel, but as the Speltz wheat was grown side by side with Red Fife for comparison the bushel has been estimated in both cases at 60 pounds.

The size of the plot for this test was one-twentieth acre, the soil a sandy loam, summer-fallowed. The Red Fife wheat was sown on April 28, and the Speltz on April 26.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	
			Inches.		Inches.		Lbs.	Bush.	Lbs.
Red Fife	Aug. 21	115	36	Stiff	3	Beardless.	3,820	23	
Speltz	" 21	117	27	Fair	2	"	3,360	45	40

The actual weight of Speltz per acre was 2,740 pounds.
The actual weight of Red Fife per acre was 1,380 pounds.

TEST OF SMUT PREVENTIVES FOR WHEAT.

Very satisfactory results have been obtained with bluestone (Copper sulphate) for this purpose, but this article has increased in value considerably during the past year and in some parts of the province has been difficult to obtain. This season a test has been made with Formalin, and, as will be seen from the accompanying table, the results have been very satisfactory. Massel Powder has also given good results.

The wheat used for seed was a very smutty sample.

Name of Variety.	How Treated.	Good Heads.	Smut Heads.
		In 9 sq. ft.	In 9 sq. ft.
Red Fife Wheat	Not treated	452	59
"	Steeped 5 minutes 4½ ounces Formalin to 10 gals. water	550	0
"	" 15 " " " " " "	529	0
"	" 1 hour " " " " "	531	0
"	Sprinkled 4½ ounces Formalin to 10 gals. water	528	0
"	" 9 " " " " "	474	0
"	" 1 pound bluestone to 1 pail water to 8 bushels of wheat.	481	0
"	Steeped 1 pound bluestone to 3 pails water	433	2
"	Treated with Massel Powder	504	0

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

Seven plots were set part for this test, but the results have been somewhat unsatisfactory, attributable no doubt to the unfavourable season ; as no rain fell for some time after the fertilizers were applied they were in all probability blown off the land before the plants had time to assimilate them.

No 1 was an outside plot somewhat exposed to injury from drifting soil, hence the small returns from it.

The size of the plots was one-fortieth acre, the soil a rich clay loam which had been summer-fallowed; all were sown on April 21, and all harvested on August 21.

The variety of wheat sown on all the plots was Red Fife, 1½ bushels of seed per acre.

	Red Fife Wheat. Fertilizers Applied.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre	Yield per Acre of Wheat.		Weight per Bushel.
		In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	100 lbs. per acre of Nitrate of Soda, one-half sprinkled when grain was 2 inches high; balance when 6 inches high	31	Stiff..	2	Beardless.	1,530	15	40	59
2	200 lbs. per acre of Nitrate of Soda, one-half sprinkled when grain was 2 inches high, balance when 6 inches high	29	" .	3	" .	1,590	30	20	58
3	No fertilizer used	29	" .	3	" .	1,860	31	20	59
4	Superphosphate, 400 lbs. per acre spread just before sowing	33	" .	$3\frac{1}{2}$	" .	2,000	26	40	60
5	Muriate of potash, 200 lbs. per acre spread just before sowing	32	" .	3	" .	1,530	29	00	60
6	A mixture, 200 pounds superphosphate, 100 pounds nitrate of soda, 100 pounds muriate potash per acre, half to be spread before sowing, half when 2 or 3 inches high	29	" .	$2\frac{3}{4}$	" .	1,900	30	00	59
7	No fertilizer used	30	" .	3	" .	2,240	28	40	$58\frac{1}{2}$

ROTATION OF CROPS.

Last year, in accordance with your instructions, arrangements were made for a series of rotation plots, the principal object in view being the maintenance of the fertility of the soil, by ploughing under a leguminous crop every third year ; instead of the usual summer-fallow.

The Soja beans were sown in rows 14 inches apart, using 60 pounds of seed per acre. The Red Clover was sown in the proportion of 12 pounds per acre, and the mixed clovers in the proportion of 8 pounds of Alfalfa and 6 pounds of Alsike per acre. These leguminous plants were to be ploughed under when they reached their fullest development. The order of rotation is as follows :—

PLAN OF ROTATION.

No.	1899.	1900.	1901.
1	Wheat	Oats	Soja Beans.
2	Wheat	Wheat	Pease.
3	Wheat	Oats	Tares.
4	Wheat	Wheat	Red Clover.
5	Wheat	Barley	Alfalfa and Alsike.
6	Pease	Wheat	Wheat.
7	Tares	Wheat	Oats.
8	Soja Beans	Wheat	Oats.
9	Red Clover	Wheat	Wheat.
10	Alfalfa and Alsike	Wheat	Barley.
11	Rape	Wheat	Summer fallow.
12	Wheat	Wheat	Summer fallow.
13	Wheat	Oats	Summer fallow.
14	Wheat	Barley	Summer fallow.
15	Wheat	Wheat	Oats.
16	Wheat	Barley	Oats.
17	Oats	Soja Beans	Wheat.
18	Wheat	Pease	Wheat.
19	Oats	Tares	Wheat.
20	Wheat	Red Clover	Wheat.
21	Barley	Alfalfa and Alsike	Wheat.
22	Rye	Summer fallow	Wheat.

RESULTS OF FIRST YEAR (1899) ON ROTATION PLOTS.

No.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Length of Straw.	Yield per Acre.		Weight per bushel.
					In.	Bush.	Lbs.	Lbs.
1	Wheat—Red Fife	May 15..	Aug. 31..	108	36	27	44	61
2	Wheat "	" 15..	" 31..	108	36	29	08	61
3	Wheat "	" 15..	" 31..	108	36	27	02	61
4	Wheat "	" 15..	" 31..	108	33	21	..	61
5	Wheat "	" 15..	" 31..	108	33	26	54	61
6	*Pease—Golden Vine	" 17..	....	.....	.....	.....	.....	.....
7	*Tares	" 17..	....	.....	.....	.....	.....	.....
8	*Soja Beans	" 17..	....	.....	.....	.....	.....	.....
9	†Clover—Red	" 17..	....	.....	.....	.....	.....	.....
10	†Clover—Alfalfa and Alsike	" 17..	....	.....	.....	.....	.....	.....
11	‡Rape	" 17..	....	.....	.....	.....	.....	.....
12	Wheat—Red Fife	" 15..	Sept. 1..	109	36	28	08	61
13	Wheat "	" 15..	" 1..	109	36	29	16	61
14	Wheat "	" 15..	" 1..	109	35	24	02	61
15	Wheat "	" 15..	" 1..	109	36	26	32	61
16	Wheat "	" 15..	" 1..	109	36	27	12	61
17	Oats—Bavarian	" 17..	Aug. 31..	106	31	27	44	37½
18	Wheat—Red Fife	May 15..	Sept. 1..	109	34	27	20	61
19	Oats—Bavarian	" 17..	" 1..	107	31	26	46	37½
20	Wheat—Red Fife	" 15..	" 1..	109	36	27	30	61
21	Barley—Odessa	" 17..	" 1..	107	36	38	38	49
22	‡Rye	" 17..	....	.....	.....	.....	.....	.....

RESULTS of Second Year (1900) on Rotation Plots.

No.	Name of Variety.	Previous Crop.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Yield per Acre.		Weight per Bushel.
						In.	Bush.	lbs.	Lbs.
1	Oats—Banner	Wheat	May 9...	Aug. 21..	104	33	18	32	35
2	Wheat—Red Fife	Wheat	April 18..	" 21..	125	27	8	26	56
3	Oats—Banner	Wheat	May 9...	" 21..	104	30	26	22	34
4	Wheat—Red Fife	Wheat	April 18..	" 24..	128	27	6	12	56
5	Barley—Odessa	Wheat	May 16...	" 25..	101	31	12	41	43½
6	Wheat—Red Fife	Pease	April 18..	" 21..	125	29	23	42	58
7	Wheat "	Tares	" 18..	" 21..	125	30	25	04	58
8	Wheat "	Soja Beans	" 18..	" 21..	125	28	27	42	58
9	Wheat "	Clover	" 18..	" 21..	125	27	15	14	57
10	Wheat "	Clover	" 18..	" 21..	125	22	11	42	57½
11	Wheat "	Rape	" 18..	" 21..	125	36	24	40	58½
12	Wheat "	Wheat	" 18..	" 23..	127	24	7	34	57
13	Oats—Banner	Wheat	May 9...	" 22.	105	29	33	12	34
14	Barley—Odessa	Wheat	" 16...	" 22..	98	24	15	32	44½
15	Wheat—Red Fife	Wheat	April 18..	" 23..	127	24	6	48	57½
16	Barley—Odessa	Wheat	May 16...	" 23..	99	22	16	44	44
17	Soja Beans	Oats	April 28..	....	.....	....	.....	.....	.....
18	Pease—Golden Vine	Wheat	" 28..	....	.....	....	.....	.....	.....
19	**Tares	Oats	" 28..	....	.....	....	.....	.....	.....
20	**Clover—Red	Wheat	" 28..	....	.....	....	.....	.....	.....
21	Clover—Alfalfa and Alsike	Barley	" 28	....	.....	....	.....	.....	.....
22	Wheat—Red Fife	Rye	" 18..	Aug. 21..	125	36	19	26	57½

* Ploughed under July 29. † Ploughed under July 4. ‡ Did not germinate, treated as summer fallow

** Ploughed under August 2.

ROTATION PLOTS.

This is the sixth year of this series of experiments, all the plots have retained the same position as last year ; the small returns from plots continuously in grain is very noticeable this year.

The size of the plots in this test was one-tenth of an acre, the soil an average sandy loam :—

No. of Plot.	1895.		1896.		1897.		1898.		1899.		1900.			Total Value.
	Crop.	Value	Crop.	Value	Crop.	Value	Crop.	Value	Crop.	Value	Crop.	Yield.	Value	
		$ c.		$ c.		$ c.		$ c.		$ c.		Tons. Lbs.	$ c.	$ c.
1	Wheat .	22 50	Turnips	22 65	Wheat..	11 75	Corn. . .	44 00	Wheat .	15 83	Corn....	4 ..	16 00	132 73
2	Wheat .	11 25	Oats....	20 95	Wheat .	6 58	Oats . . .	15 14	Wheat .	13 50	Oats....	20 ..	6 00	73 42
3	Wheat .	8 25	Wheat .	16 83	Wheat .	11 33	Wheat .	13 91	Wheat .	9 58	Wheat..	5 20	3 20	63 10
4	Barley..	9 63	Wheat .	14 25	Oats....	8 75	Barley .	10 10	Wheat .	12 42	Oats....	15 20	4 67	59 82
5	Wheat .	22 91	Fallow .	.....	Wheat..	13 91	Fallow..	.....	Wheat .	17 50	Fallow .	.....	.....	54 32
6	Fallow .	.....	Wheat .	18 33	Oats....	9 41	Fallow..	.....	Wheat .	16 75	Oats....	31 6	9 35	53 84
7	Fallow..	.....	Wheat .	17 08	Barley..	5 52	Oats . . .	16 17	Fallow .	.....	Wheat..	14 35	8 75	47 52
8	Fallow..	.....	Wheat .	14 41	Oats....	9 04	Oats....	14 19	Fallow..	.....	Oats....	32 22	9 79	47 43

In estimating the value of the crops the following figures have been adopted throughout : Wheat has been taken at 50 cents per bushel ; barley at 25 cents ; oats at 25 cents and turnips at 5 cents per bushel. The value of corn cut green for ensilage has been taken at $2 per ton.

DEEP, MEDIUM AND SHALLOW SOWING.

The result of this test this year would appear to favour medium sowing as the highest average was obtained from 2-inch sowing.

The size of the plots used for this test was one-twentieth of an acre, and the soil was a sandy loam, summer-fallowed. The sowing was done with a drill :—

Name of Variety.	Depth Sown.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
					In.		In.		Lbs.	Bush.	lbs.	Lbs
Wheat—Red Fife	1 inch deep.	April 28	Aug. 21	115	36	Stiff..	3½	Beardless.	3,330	22	50	57
" " ..	2 " .	" 28	" 21	115	36	Fair..	3	" .	3,820	23	..	58
" " ..	3 " .	" 28	" 21	115	36	"	3	" .	3,540	19	20	55
Oats—Banner....	1 " .	May 11	" 28	109	38	Stiff..	8	Branching	2,750	27	32	28
" "	2 " .	" 11	" 28	109	38	" .	8	" .	2,350	27	32	29
" "	3 " .	" 11	" 28	109	38	" .	8	" .	3,350	25	..	28½
Barley—Mensury.	1 " .	" 11	" 21	102	36	" .	4	6-rowed...	2,510	24	38	41
" " ..	2 " .	" 11	" 21	102	36	" .	4	" ..	3,060	25	40	41
" " ..	3 " .	" 11	" 21	102	36	" "	4	" ..	2,840	20	..	41

EXPERIMENTS WITH OATS.

While this grain suffered less than wheat from poor germination in spring, the loss from hail was much greater. On the morning of August 18, the ground on the riper fields was practically covered with shelled grain. As an evidence of this, Flying Scotchman, generally not a very productive variety, was cut before the hail storm and gave a return of over 65 bushels per acre, while Improved Ligowo, usually a much more productive kind, but cut after the hail storm, only yielded 20 bushels and 30 pounds per acre. For this reason the returns given from the uniform trial plots of oats cannot be considered a fair test of the comparative productiveness of the varieties.

Owing to the prevalence of rust, and to the fact that the plumpest kernels were shelled out by hail, nearly all the varieties are light in weight.

Oat sheaves, only wet on the surface, were stacked with safety, but when wet to the heart, it was found necessary to thoroughly dry them before stacking. The patience of many farmers was severely tried this year, owing to the continued wet weather, and many stacked oats too soon ; with the result that at threshing time they were more or less heated, resulting in serious loss.

Sixty-one varieties were under test during 1900, but two of them, viz.: Columbus and New Electric, were completely destroyed by hail and were not harvested. The size of the plots was one-twentieth of an acre each, the soil was a clay loam summer-fallowed. All the plots were sown on May 3 and 4 :—

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Black Beauty	Aug. 15.	104	36	V. weak	10	Branching	2,080	71	16	33	Slightly.
2	Rosedale............	″ 15.	104	39	Stiff ...	10	Half sided	4,130	66	26	34½	″
3	Flying Scotchman...	″ 15.	103	41	″ ...	9	Branching	3,760	65	30	34	″
4	Brandon	″ 15.	104	40	Fair....	9	Half sided	2,190	65	10	34	″
5	Hazlett's Seizure....	″ 15.	104	40	″	12	Branching	4,230	60	30	35½	″
6	Master..............	″ 15.	104	44	Stiff ...	9	Half sided	1,950	58	28	33	″
7	Miller	″ 15.	104	36	″ ...	9	Branching	4,290	56	6	33	None.
8	Oxford........	″ 16.	104	35	Fair....	8	Half sided	1,935	56	..	34	Slightly.
9	Black Mesdag.......	″ 15.	104	35	V. weak	9	Branching	2,665	54	34	28	None.
10	Cream Egyptian. ...	″ 14.	102	36	Stiff ...	8	Half sided	3,330	52	2	37½	Considerably.
11	Holland.............	″ 18.	106	37	Fair....	9	Sided.....	2,870	39	4	30	Slightly.
12	Joanette.............	″ 17.	105	40	Weak ..	9	Branching	3,770	33	8	30	″
13	Buckbee's Illinois....	″ 17.	105	39	Fair....	8	″	2,290	32	22	32½	″
14	Banner..	″ 18.	107	36	Stiff ...	7	″	2,920	28	28	34½	″
15	Early Golden Prolific.	″ 16.	105	37	Fair....	6	″	2,160	27	22	33	″
16	Early Archangel.....	″ 18.	106	50	″	10	″	2,570	27	12	35	None.
17	Wide Awake........	″ 17.	105	42	″	8	″	2,480	27	2	35	Slightly.
18	Siberian O. A. C.....	″ 17.	105	39	″	9	″	2,480	27	2	34	″
19	New Zealand.	″ 16.	105	32	″	8	″	3,180	27	2	35	″
20	Improved American.	″ 16.	105	34	Stiff ...	9	″	2,800	26	16	34	″
21	Danish Island......	″ 16.	105	39	″ ...	8	″	2,600	26	16	33	″
22	Golden Giant	″ 16.	104	36	Fair....	7	Sided.....	2,710	26	6	30	″
23	Salzer's Big 4..	″ 17.	105	34	Weak ..	7	Branching	3,610	26	6	28½	″
24	Early Maine	″ 16.	105	38	Fair....	8	″	2,510	26	.	31	″
25	Oderbruch	″ 17.	105	41	″	9	Half sided	2,920	25	30	33	″
26	Thousand Dollar.....	″ 17.	105	37	″ ...	7	Branching	2,930	25	20	34½	″
27	California Prolific Blk (Imp.)............	″ 18.	107	41	″	11	Sided....	3,820	25	20	28	″
28	American Triumph..	″ 16.	105	34	″	8	Branching	2,440	25	10	32	″
29	Bavarian............	″ 17.	105	40	″	9	″	2,950	25	..	32½	″
30	Abundance..........	″ 18.	107	35	″	5	″	1,970	24	14	33	″
31	King................	″ 17.	105	34	″	8	″	2,370	24	14	32½	″
32	Kendal	″ 17.	105	35	″	8	Sided.....	3,190	23	28	28	″
33	California Prolific Blk	″ 18.	107	36	″	9	″ ...	3,700	23	28	29	″
34	Prolific Blk Tartarian	″ 16.	105	32	″	8	″	3,700	23	18	28	″
35	Abyssinia...........	″ 17.	105	35	″ ...	8	Half sided	1,910	23	8	34	″
36	Black Tartarian(Imp)	″ 18.	107	36	″	8	Sided.....	3,820	22	32	27	″
37	Wallis...............	″ 16.	105	38	Stiff ...	7	Branching	2,730	22	22	33	None.
38	White Giant	″ 16.	105	35	″	8	″	2,640	22	12	34	Slightly.
39	Mennonite..........	″ 17.	105	35	Fair....	9	″	2,640	22	12	33	″
40	Early Gothland	″ 17.	105	33	″	8	Half sided	2,250	22	2	34	″
41	Newmarket	″ 18.	106	39	″	8	Branching	2,250	22	2	34	″
42	Improved Ligowo....	″ 16.	105	37	″	8	″	2,090	20	30	35	″
43	Salines	″ 17.	105	42	″	10	″	2,100	20	20	30	″
44	Holstein Prolific.....	″ 17.	105	38	″	8	″	2,300	20	20	34	″
45	Golden Beauty......	″ 17.	105	40	″	9	″	2,070	20	10	33	″
46	Sensation....	″ 17.	105	33	″	6	″	2,540	19	14	33½	″
47	Golden Tartarian....	″ 19.	107	49	″ ...	9	Sided. ...	2,840	19	14	30	Considerably.
48	Improv'd Ligowo(I'p)	″ 18.	106	32	″	11	Branching	1,950	19	4	31	Slightlly.
49	Pense	″ 18.	107	39	″ ...	9	Half sided	3,470	18	18	28	″
50	Lincoln	″ 19.	107	48	″	7	Branching	3,180	18	8	33	″
51	White Russian.......	″ 18.	107	32	″	7	″	2,180	18	8	33	″
52	Olive...............	″ 16.	105	38	″	9	Half sided	3,190	17	32	30	″
53	White Schonen......	″ 16.	105	34	″ ...	9	Branching	2,220	17	2	33	″
54	Milford	″ 17.	105	42	″	9	Half sided	2,530	16	26	28½	″
55	American Beauty....	″ 16.	104	38	Stiff ...	8	Branching	3,380	15	10	35	″
56	Russell..............	″ 18.	106	36	Fair....	11	Half bran.	1,550	13	8	32½	″
57	Cromwell	″ 17.	105	34	″	8	Branching	2,190	12	2	33½	Considerably.
58	Early Blossom.......	″ 18.	106	35	″	9	Half sided	1,890	9	4	33	Slightly.
59	Bonanza	″ 15.	103	42	Stiff....	9	Branching	2,090	9	4	36½	″

NOTE—The first ten varieties on the list were cut before the hail storm; the others were cut after the storm.

FIELD PLOTS OF OATS.

The first three varieties were sown on backsetting, the remainder on summer-fallow. The soil was a clay loam :—

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield per Acre.	
					Bush.	Lbs.
Bavarian	3 acres..	May 3..	Aug. 21..	110	44	18
Golden Giant	5 " .	" 5..	" 24..	111	53	15
American Beauty	5 " .	" 5..	" 21..	108	40	2
Abundance	3¾ " .	" 8..	" 24..	108	32	4
Early Golden Prolific	2½ " .	" 8..	" 24..	108	51	6
Joanette	1 " .	" 9..	" 26.	109	22	9
California Prolific Black	1 " .	" 9..	" 26..	109	36	1

TEST OF SMUT PREVENTIVES FOR OATS.

The seed for this test was a very smutty sample, as is evident from the resultant 51 per cent of smut from the untreated seed.

Formalin has again proven itself a very useful preparation for this purpose and its general use, each year, would save thousands of dollars to the province.

Massel powder does not appear to be of much value as a preventive of smut in oats.

Name of Variety.	How Treated.	Good Heads on Nine Sq. Ft.	Smut Heads on Nine Sq. Ft.
Doncaster Prize	Not treated	128	66
"	Steeped 5 minutes, 4½ oz. formalin to 10 galls. water	233	3
"	" 15 " 4½ " 10 "	188	5
"	" 1 hour 4½ " 10 "	211	0
"	Sprinkled, 4½ oz. formalin to 10 galls. water	195	5
"	" 9 " 10 "	262	0
"	Treated with Massel powder	186	108

EXPERIMENTS WITH BARLEY.

This grain, owing to its having been sown later than either wheat or oats, did not suffer so much from drought or hail, the principal loss was from drifting soil, the tender foliage of barley making it particularly susceptible to injury from this cause.

The size of the plots used for this test was one-twentieth of an acre, the soil was a sandy loam, summer-fallowed, and the plots were all sown on May 17 and 18. Forty-nine varieties were included in this test, nineteen of the two-rowed barley and thirty of the six-rowed.

Barley—Two Rowed—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				Ins.		Ins.	Lbs.	Bush.	Lbs.	Lbs.	
1	Canadian Thorpe	Sept. 8..	112	33	Stiff..	3½	2,950	34	18	47½	Slightly.
2	French Chevalier	〃 12..	116	36	〃 .	4	3,210	28	46	46	Considerably.
3	Danish Chevalier	〃 12..	116	32	Weak	4½	3,030	28	26	46	〃
4	Victor	〃 4..	108	34	Fair..	4	2,270	27	34	48½	Slightly.
5	Nepean	〃 8..	112	33	Stiff..	3½	2,120	26	32	48½	〃
6	Kinver Chevalier	〃 12..	116	36	Fair..	4	1,930	24	18	46	Considerably.
7	Sidney	〃 1..	105	32	Stiff..	4½	1,850	23	46	47	Slightly.
8	Beaver	〃 12..	116	24	〃 .	3½	2,050	23	46	48	〃
9	Prize Prolific	〃 12..	116	31	〃 .	4	2,260	23	36	46	〃
10	Newton	〃 8..	112	31	〃 .	4	2,505	22	39	48	〃
11	Jarvis	〃 2..	106	39	Fair..	4½	2,615	22	29	46	〃
12	Gordon	〃 1..	105	36	Stiff..	2½	2,260	21	32	44	〃
13	Bolton	〃 1..	105	36	Fair..	3	1,990	21	2	47	〃
14	Leslie	〃 4..	108	36	Stiff..	4	1,640	20	..	47	〃
15	Logan	〃 1..	105	36	Fair..	4	3,050	19	38	47½	〃
16	Clifford	〃 1..	105	34	Stiff..	3½	2,180	19	8	46	〃
17	Dunham	〃 1..	105	33	〃 .	3	1,910	17	44	45	〃
18	Harvey	〃 5..	109	36	〃 .	4	2,180	17	2	46	Considerably.
19	Fulton	〃 3..	107	33	〃 .	3	1,990	16	42	46½	Slightly.

Barley—Six Rowed—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.		
1	Odessa	Aug. 24..	99	28	Fair..	2½	4,900	42	34	47	Slightly.
2	Mensury	〃 21..	96	40	Stiff	3	2,240	40	40	44	〃
3	Pioneer	〃 26..	101	38	Fair	3	2,960	40	20	49	〃
4	Oderbruch	〃 22..	97	29	〃	2½	1,760	40	20	48	〃
5	Nugent	〃 26..	101	29	Stiff	2½	2,115	37	9	46	Considerably.
6	Yale	〃 24..	99	31	Fair	2½	2,460	36	12	46	Slightly.
7	Claude	〃 26..	101	32	Stiff	3½	1,660	36	12	43	Considerably.
8	Mansfield	〃 23..	98	35	Fair	3	2,190	35	30	44	Slightly.
9	Stella	〃 27..	102	32	Stiff	2½	2,270	33	46	47	Considerably.
10	Empire	〃 25..	100	34	〃	2	2,100	33	16	48	Slightly.
11	Blue Long Head	〃 23..	98	25	〃	2	2,000	33	16	41	〃
12	Garfield	〃 22..	97	35	Fair	2½	3,130	32	34	46	〃
13	Brome	〃 24..	99	32	〃	2½	2,490	31	22	48	〃
14	Success	〃 21..	96	38	Stiff	3	1,490	31	22	39½	〃
15	Surprise	〃 24..	99	32	Fair	2½	2,300	31	12	46	〃
16	Common	〃 22..	97	36	〃	3	1,670	29	38	45½	〃
17	Champion	〃 21..	96	36	Stiff	3	1,690	29	18	38½	〃
18	Excelsior	〃 21..	96	34	〃	3	1,680	27	24	38½	〃
19	Trooper	Sept. 25..	100	30	〃	3	2,310	26	42	47	〃
20	Rennie's Improved	〃 22..	97	34	Fair	3	1,550	26	2	46	〃
21	Vanguard	〃 23..	98	33	Stiff	2½	1,460	25	40	44	〃
22	Phoenix	〃 23..	98	31	Fair	2	1,860	25	40	46½	〃
23	Summit	〃 28..	103	31	〃	3½	1,820	24	28	47	〃
24	Baxter	〃 22..	97	37	Stiff	3	2,080	21	12	46	〃
25	Albert	〃 1..	105	27	Fair	3	1,800	20	40	47½	〃
26	Petschora	〃 1..	105	33	〃	3	1,720	18	16	43	〃
27	White Hulless	〃 1..	105	26	〃	2½	2,250	17	34	52	〃
28	Royal	〃 1..	105	24	〃	3	2,110	16	22	46	〃
29	Black Hulless	〃 1..	105	27	〃	2½	2,140	15	40	55½	〃
30	Argyle	〃 1..	105	38	〃	3	2,470	15	10	43½	〃

FIELD PLOTS OF BARLEY.

(All sown on summer fallow; soil, clay loam.)

Number.	Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield per Acre. Bush.	Yield per Acre. Lbs.
1	Trooper	1 acre	May 15	Aug. 18	95	15	..
2	Bolton	1 "	" 15	" 18	95	15	10
3	Royal	2 "	" 15	" 24	101	35	11
4	Beaver	$1\frac{3}{4}$ "	" 15	" 24	101	33	3

TEST OF SMUT PREVENTIVES IN BARLEY.

This grain has proven very difficult of treatment with bluestone. Formalin gives better results, but so far has not proved a complete success.

Both the Canadian Thorpe and Odessa barley, used for seed, were very smutty.

Name of Variety.	How Treated.	Good Heads on 9 sq. ft.	Smut Heads on 9 sq. ft.
Odessa Barley	Not treated	349	26
"	Steeped 5 min. $4\frac{1}{2}$ oz. formalin to 10 galls. water	254	1
"	" 15 $4\frac{1}{2}$ " " "	330	7
"	" 1 hour $4\frac{1}{2}$ " " "	303	4
"	Sprinkled $4\frac{1}{2}$ " " "	437	19
"	" 9 " " "	375	3
"	Treated with Massel Powder	435	9
Canadian Thorpe Barley	Not treated	278	88
" "	Steeped 5 min. $4\frac{1}{2}$ oz. formalin to 10 galls. water	301	9
" "	" 15 $4\frac{1}{2}$ " " "	370	1
" "	" 1 hour $4\frac{1}{2}$ " " "	235	21
" "	Sprinkled $4\frac{1}{2}$ " " "	288	1
" "	" 9 " " "	354	3

EXPERIMENTS WITH PEASE.

Fifty-nine varieties of pease were sown, but two of them, viz., Wisconsin Blue and Grass pea were destroyed by cut-worm; thirteen of the other varieties were also more or less injured from the same cause, the last ten in the list being very much injured. With these exceptions, pease have escaped injury, and the returns are nearly equal to an average crop.

The size of the plots for this test was one-twentieth of an acre, and the soil was a rich, moist clay loam, summer-fallowed. All were sown between April 21 and 23.

PEASE—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	In.		Bush.	Lbs.	Lbs.
1	King	Aug. 31	132	Rank	53	3	Large	44	....	$60\frac{1}{2}$
2	White Wonder	" 31	130	"	41	3	"	43	....	$62\frac{1}{2}$
3	Carleton	" 29	130	"	59	$2\frac{1}{2}$	Medium	42	40	60
4	Trilby	" 30	131	"	57	2	"	42	30	63
5	Prince	" 29	130	"	54	$2\frac{1}{2}$	Large	41	40	$60\frac{1}{2}$
6	Pearl	" 29	130	"	47	$2\frac{1}{2}$	Medium	40	....	$62\frac{1}{2}$
7	Archer	" 31	130	"	47	3	"	39	30	63
8	Bright	" 31	132	"	59	$2\frac{3}{4}$	"	39	....	62
9	Chelsea	" 30	131	Fair	46	2	"	39	....	60
10	Elliot	" 28	129	Very weak	42	$2\frac{1}{2}$	Large	38	30	62
11	White Marrowfat	" 31	132	Rank	47	3	"	38	30	61
12	Agnes	" 28	129	Fair	39	3	"	38	....	$59\frac{1}{2}$
13	Prussian Blue	" 31	130	Rank	42	2	Medium	37	30	$63\frac{1}{2}$
14	Duke	" 31	130	"	41	$2\frac{1}{2}$	Large	37	10	62
15	German White	" 30	131	Weak	46	2	Small	36	40	62
16	Macoun	" 30	131	Rank	47	$2\frac{1}{2}$	Medium	36	20	61
17	Dover	" 31	130	"	42	3	Large	35	30	63
18	Prince Albert	" 30	129	"	41	2	Small	35	10	63
19	Perth	" 29	130	Fair	42	$2\frac{1}{2}$	Large	35	....	62
20	Herald	" 30	131	Rank	46	$2\frac{1}{4}$	Small	34	30	61
21	Bruce	" 30	131	"	50	$2\frac{1}{2}$	Large	34	20	$59\frac{1}{2}$
22	Daniel O'Rourke	" 27	128	Weak	37	2	Small	33	50	62
23	Golden Vine	" 29	130	"	47	2	"	33	20	$60\frac{1}{2}$
24	Fergus	" 30	131	Rank	47	$2\frac{1}{2}$	Medium	33	10	$61\frac{1}{2}$
25	Multiplier	" 30	129	"	47	2	Small	32	50	62
26	Bedford	" 29	130	Fair	42	2	Medium	32	40	$62\frac{1}{2}$
27	Harrison's Glory	" 29	130	Very weak	23	3	Large	32	30	$61\frac{1}{2}$
28	Victoria	" 30	129	"	47	$2\frac{1}{2}$	Medium	32	20	$62\frac{1}{2}$
29	Elder	" 30	129	Rank	36	$2\frac{1}{2}$	"	32	....	$62\frac{1}{2}$
30	Field Gray	" 26	125	Fair	34	2	Small	31	40	60
31	Chancellor	" 28	129	Very weak	34	2	"	31	30	61
32	Creeper	" 29	130	Weak	49	2	"	31	20	61
33	Vincent	" 31	130	"	32	3	Large	31	20	63
34	Crown	" 28	129	Fair	31	2	Small	31	10	62
35	Centennial	" 31	130	Rank	44	3	Large	31	....	$63\frac{1}{2}$
36	Kent	" 30	131	Very weak	45	3	"	31	....	62
37	English Gray	" 31	130	Weak	36	$2\frac{1}{2}$	Medium	30	50	$60\frac{1}{2}$
38	Maple	" 31	132	Very weak	50	3	"	30	40	60
39	Mummy	" 27	128	Weak	24	3	Large	30	....	62
40	Lanark	" 31	132	Rank	42	3	"	30	....	61
41	Pride	" 28	129	Fair	45	$2\frac{1}{2}$	"	29	50	63
42	Fenton	" 30	131	Rank	44	$2\frac{1}{2}$	"	29	40	$62\frac{1}{2}$
43	Mackay	" 29	128	"	45	3	"	28	40	$62\frac{1}{2}$
44	Gregory	" 31	132	"	57	3	Medium	26	30	$63\frac{1}{2}$
45	Nelson	" 29	128	"	30	$2\frac{1}{2}$	"	26	....	63
46	Alma	" 28	127	"	40	$2\frac{1}{2}$	Small	25	10	62
47	Early Britain	" 30	129	"	42	$2\frac{1}{2}$	Large	25	10	60
48	Picton	" 29	128	Fair	43	$2\frac{1}{2}$	Medium	24	40	$62\frac{1}{2}$
49	Paragon	" 28	127	"	13	$2\frac{1}{2}$	"	22	50	$61\frac{1}{2}$
50	Arthur	" 28	127	Weak	39	$2\frac{1}{2}$	Small	22	40	62
51	Black-eyed Marrowfat	" 29	130	Rank	48	3	Large	22	40	$58\frac{1}{2}$
52	Canadian Beauty	" 31	130	Fair	46	$2\frac{1}{2}$	Medium	21	30	62
53	New-Potter	" 28	127	"	40	3	"	18	30	$62\frac{1}{2}$
54	Cooper	" 30	129	"	42	2	"	17	40	$62\frac{1}{2}$
55	Oddfellow	" 31	130	Rank	49	2	Small	17	10	62
56	Elephant Blue	" 28	127	Weak	27	3	Medium	16	30	$61\frac{1}{2}$
57	French Canner	" 27	126	"	34	3	Small	12	40	61

EXPERIMENTS WITH FLAX.

Like all other small seeds, flax germinated very unevenly this year, in some instances the plants were over a foot apart. This greatly lessened the yield of both seed and fibre. Owing to the large number of weeds which came up in the vacancies between the plants, it was thought advisable to pull all the plots instead of cutting one half of them with a binder as is usually done.

All the plants were sown in rich black loam, which had been summer-fallowed. The size of the plots was one-twentieth of an acre.

Variety.	Amount of Seed Sown per acre.	Date of Sowing.	Length of Straw.	Date when pulled for fibre.	Weight of Straw when pulled for fibre, per acre.	Yield of Seed per acre.		Weight per Bushel.
	Lbs.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
Flax	40	April 28..	20 to 30	Sept. 1...	1,600	6	4	53
"	80	" 28..	20 to 30	" 1...	2,500	6	4	53
"	40	May 5..	20 to 30	" 1...	2,100	6	24	54
"	80	" 5..	20 to 30	" 1...	2,700	6	4	54
"	40	" 12..	20 to 30	" 1...	3,300	7	8	53
"	80	" 12..	20 to 30	" 1...	2,700	6	44	53½
"	40	" 19..	20 to 30	" 1...	2,500	5	40	54
"	80	" 19..	20 to 30	" 1...	3,500	6	44	54

CANARY SEED.

A plot of Canary seed was sown on May 29, but owing to the dry season the seed did not germinate in time for the grain to ripen.

BUCKWHEAT.

Three varieties of Buckwheat were sown on May 26, but the seed lay dormant until July, and although all the varieties blossomed freely, no seed was formed.

EXPERIMENTS WITH INDIAN CORN.

The soil selected for a comparative test of varieties was not suitable for corn, being too level, and for that reason the yield was below the average. The location selected for the field crop was a warm soil, with a decided slope to the south, and the yield there was much better.

The corn was several inches above the ground on June 8, and the eight degrees of frost which was then experienced, cut it level with the ground, but it quickly recovered, and was apparently none the worse for it.

Besides the plots devoted to the test of varieties, 2½ acres were cured as dry fodder, and several bushels of Squaw corn, a very early native variety, was ripened for seed purposes. This variety is much used as a table corn throughout the province.

The land selected for the test of varieties was a black loam which produced a crop of potatoes in 1899. It was ploughed seven inches deep in early spring, and the surface cultivated until May 19, when the drilled plots were sown in rows three feet apart, with a common wheat drill, and the hilled plots planted with a hoe three feet apart each way. Owing to the hilled plots being planted too shallow, the seed did not germinate until the rains, which came late in June. The yield per acre has been calculated from the weight of crop cut from one row 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

	Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk,	Condition when cut.	Weight per acre grown in rows. Tons.	Lbs.	Weight per acre grown in hills. Tons.	Lbs.
			In.										
1	Thoroughbred White Flint...	Rank.	86	Very leafy	Aug. 24	....	....	....	In tassel..	29	1,400	9	40
2	Ruby Mexican...	Fair..	79	Fair.. ...	" 2	Aug. 10	Aug. 24	Aug. 30	L. Milk ..	24	620	12	200
3	North Dakota White.........	.	75	Very leafy	" 15	" 21	" 30	....	E. " ..	22	1,100	10	1,120
4	Pearce's Prolific..	Rank.	80	" "	" 10	" 15	" 24	Aug. 31	L. " ..	22	220	8	1,820
5	Early Yellow, Long-eared....	" .	75	" "	" 15	" 20	" 24	Sept. 3	L. " ..	22	220	7	300
6	Early Mastodon.	Fair..	88	Fair......	" 28	......	....	..... .	In tassel..	20	920	7	300
7	Compton's Early.	Rank.	83	Very leafy	" 15	Aug. 20	Aug. 28	. .....	E. Milk..	20	700	8	500
8	Mitchell's Extra Early.........	Weak	54	" "	" 2	" 8	" 15	Aug. 24	L. " ..	20	480	8	940
9	Sanford....	" .	72	" "	" 15	" 23	" 30	Sept. 3	L. " ..	19	1,160	8	500
10	King of the Earliest.......	Fair..	76	" "	" 22	" 29	Sept. 3	... ...	E. " ..	19	500	8	500
11	Angel of Midnight........	" .	92	Fair......	" 16	" 22	Aug. 29	....	E. " ..	18	1,620	7	1,840
12	Canada White Flint.........	" .	85	"	" 15	" 23	" 29	.... .	E. " ..	18	1,180	8	500
13	Superior Fodder.	" .	72	Very leafy	" 25	.... ..	....	....	In tassel..	17	1,640	10	900
14	North Dakota Yellow........	Weak	70	" "	" 2	Aug. 10	Aug. 24	Aug. 30	L. Milk ..	17	100	9	100
15	Giant Prolific Ensilage.......	Rank.	72	Fair......	" 24	.... ..	....	.....	In tassel..	16	1,440	8	1,600
16	Selected Leaming	Fair..	76	"	" 18	Aug. 23	Aug. 27	Sept. 3	L. Milk ..	16	120	8	1,380
17	Kendall's Early Giant.........	" .	62	Very leafy	" 8	" 20	" 25	" 2	L. " ..	16	120	7	1,400
18	Pride of the North	" .	96	Fair......	" 24	" 27	Sept. 3	... .	E. " ..	15	1,900	8	940
19	Mammoth eight-rowed Flint ...	Rank,	82	Very leafy	" 12	" 22	Aug. 29	.. ....	E. " ..	15	1,900	7	1,400
20	Early Butler....	Fair..	86	Fair......	" 16	" 22	" 31	....	E. " ..	15	1,240	7	1,620
21	Cloud's Early Yellow..	" .	91	"	" 19	" 24	" 30	....	E. " ..	15	1,240	10	20
22	Longfellow......	Rank.	84	Very leafy	" 15	" 20	" 29	....	E. " ..	15	1,020	7	1,840
23	Champion White Pearl..........	Fair..	101	Fair.. ...	" 23	" 30	....	......	In silk....	15	800	8	280
24	Red Cob Ensilage	Rank.	75	Leafy	Sept. 3	. . .	..... .	.... ..	In tassel..	15	360	7	300
25	Mammoth Cuban	" .	93	Few......	Aug. 22	Aug. 27	Sept. 3	.. ...	E. Milk ..	14	1,700	8	1,820
26	Salzer's All Gold.	Fair..	76	Leafy	" 15	" 24	Aug. 30	..... .	E. " ..	13	840	6	540
27	White Cap Yellow Dent ...	" .	76	Few......	" 15	" 22	" 27	. . . .	E. " ..	12	1,520	9	920
28	Extra Early Huron Dent...	" .	84	"	" 15	" 24	" 31	Sept. 3	L. " ..	12	1,520	7	1,840
29	Evergreen Sugar.	Rank.	64	Very leafy	" 24	... .	....	....	In tassel..	12	420	3	1,260
30	Extra Early Szekely.....	Weak	61	Leafy	" 3	Aug. 8	Aug. 18	Aug. 24	L. Milk ..	11	1,100	5	1,000
31	Country Gentleman......	Fair..	67	"	" 20	" 30	Sept. 3	..... .	E. " ..	11	1,100	6	540
32	Yellow Six-weeks	" .	51	"	" 8	" 15	Aug. 20	Aug. 31	L, " ..	10	900	6	1,200
33	Salzer's Earliest Ripe.........	" .	68	"	" 2	" 10	" 24	" 30	L. " ..	8	500	7	1,180

INDIAN Corn Sown at Different Distances Apart.

Name of Variety.	Distance between rows.	Height.	Condition When Cut.	Weight per acre in rows.		Weight per acre in hills.	
	Inches.	Inches.		Tons.	Lbs.	Tons.	Lbs.
Longfellow	21	73	Late milk	17	697	15	548
"	28	73	"	14	1,709	13	1,437
"	35	73	"	16	1,943	14	1,643
"	42	73	"	14	1,417	14	97
Selected Leaming	21	72	"	18	1,714	18	960
"	28	72	"	17	1,640	16	1,377
"	35	72	"	17	395	16	1,716
"	42	72	"	14	1,040	13	1,908
Champion White Pearl	21	82	Early milk	24	1,028	21	1,368
" "	28	82	"	19	600	18	1,620
" "	35	82	"	14	1,869	14	964
" "	42	82	"	15	548	14	1,894

AVERAGE Yield at Different Distances.

	In rows.		In hills.	
	Tons.	Lbs.	Tons.	Lbs.
Average yield of green corn, 21 inches apart	20	479	18	958
" " " 28 "	17	646	16	811
" " " 35 "	16	735	15	774
" " " 42 "	14	1,668	14	633

FIELD ROOTS.

The past season has been a very unfavourable one for all classes of field roots. The very loose and dry condition of the soil at sowing time caused it to drift with the wind, in some instances carrying the seed into adjoining fields. No rain fell between the date of sowing and June 26 so that very few seeds germinated until July 1, making the season much too short for any of the field roots.

EXPERIMENTS WITH TURNIPS.

In common with other field roots, turnips have given a small yield, this year the returns being about one-half of an ordinary crop. The soil chosen for these experiments was a rich clay loam ; the previous crop was fodder corn. Two sowings were made of each variety. The first plots were sown May 19, the second on June 2, and the roots from both were pulled on October 29. The estimate of yield has been made from the product of two rows each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Champion Purple Top	12	1,080	418	..	10	1,384	356	24
2	Giant King	10	1,120	352	..	8	1,160	286	..
3	Webb's New Renown	10	1,120	352	..	15	360	506	..
4	Perfection Swede	10	1,120	352	..	12	1,872	431	12
5	Magnum Bonum	10	856	347	36	9	1,800	330	..
6	Carter's Elephant	10	64	334	24	8	1,160	286	..
7	Hartley's Bronze	9	1,800	330	..	13	400	440	..
8	Prize Purple Top	9	1,800	330	..	12	1,344	422	24
9	Selected Champion	9	1,800	330	..	15	360	506	..
10	Imperial Swede	9	480	308	..	13	400	440	..
11	Kangaroo	9	480	308	..	10	1,120	352	..
12	Drummond Purple Top	9	216	303	36	10	328	338	48
13	Prize Winner	8	1,160	286	..	12	1,080	418	..
14	Skirving's	8	1,160	286	..	15	1,680	528	..
15	Sutton's Champion	8	1,160	286	..	11	440	374	..
16	East Lothian	8	368	272	48	13	136	435	36
17	Elephant's Master	7	520	242	..	9	480	308	..
18	Shamrock Purple Top	8	104	268	24	14	1,040	484	..
19	Selected Purple Top	7	1,048	250	48	11	704	378	24
20	West Norfolk Red Top	7	1,048	250	48	12	1,608	426	48
21	New Arctic	7	1,576	259	36	9	480	308	..
22	Marquis of Lorne	6	1,992	233	12	11	440	374	..
23	Monarch	6	1,200	220	..	8	1,160	286	..
24	Mammoth Clyde	6	936	215	36	11	440	374	..
25	Jumbo	5	1,880	198	..	11	704	378	24
26	Hall's Westbury	5	1,088	184	48	15	1,680	528	..
27	Bangholm Selected	5	560	176	..	14	1,040	484	..
28	Halewood's Bronze Top	4	1,240	154	..	11	1,760	396	..

EXPERIMENTS WITH MANGELS.

The soil on which the mangels were grown was a rich clay loam and the previous crop was fodder corn. Twenty-three varieties were tested. Two sowings were made of each variety, the first on May 19, the second on June 2, and the roots from both were pulled October 2. The seed was sown in drills thirty inches apart, and the yield has been calculated from the weight of roots gathered from two rows each 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth Oval Shaped	14	1,832	497	12	15	1,416	523	36
2	Mammoth Long Red	13	928	448	48	13	136	435	36
3	Selected Mammoth Long Red	13	664	444	24	21	240	704	..
4	Giant Yellow Globe.	12	816	413	36	12	1,608	426	48
5	Giant Yellow Intermediate	12	552	409	12	11	440	374	..
6	Norbiton Giant	12	552	409	12	12	816	433	36
7	Prize Mammoth Long Red	11	1,760	396	..	13	400	440	..
8	Lion Yellow Intermediate	11	704	378	24	8	1,688	294	48
9	Mammoth Yellow Intermediate	11	704	378	24	....		....	
10	Warden Orange Globe	11	176	369	36	8	632	277	12
11	Giant Yellow Half Long	10	1,648	360	48	11	1,232	387	12
12	Gate Post	10	1,384	356	24	15	888	514	48
13	Champion Yellow Globe	10	1,384	356	24	12	288	404	48
14	Half Long Sugar Rosy	10	1,384	356	24	11	704	378	24
15	Gate Post Yellow	10	328	338	48	8	1,680	294	48
16	Canadian Giant	10	328	338	48	13	1,720	462	..
17	Ward's Large Oval Shaped	9	744	312	24	13	928	448	48
18	Sutton's Prize Winner	8	1,952	299	12	11	1,760	396	..
19	Golden Fleshed Tankard	8	1,952	299	12	7	1,312	255	12
20	Yellow Fleshed Tankard	8	1,688	294	48	8	896	281	36
21	Half Long Sugar White	7	1,840	264	..	12	1,608	426	48
22	Yellow Intermediate	5	32	167	12	13	664	444	24
23	Red Fleshed Tankard	4	976	149	36	17	1,904	598	24

EXPERIMENTS WITH CARROTS.

Nineteen varieties of carrots were tested this year. As usual two sowings were made of each variety, but owing to the drought the first sown seed germinated so unevenly that accurate returns could not be obtained.

The soil on which these roots were sown was a rich clay loam which had produced a crop of corn in 1899. The estimate of yield has been made from the roots produced on two rows each 66 feet long.

The first sowing was made on May 19 and the second on June 2. The seed was sown in drills 18 inches apart. All were pulled on October 4.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre 2nd Sowing.		Yield per Acre 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.
Green Top White Orthe	5	1,880	198	..
Half Long Chantenay	5	1,000	183	20
Giant White Vosges	5	1,000	183	20
Early Gem	5	1,000	183	20
Guerande or Ox-Heart	5	560	176	..
Half Long White	5	560	176	..
Improved Short White	4	1,240	154	..
Carter's Orange Giant	4	1,240	154	..
New White Intermediate	4	1,240	154	..
Iverson's Champion	4	360	139	20
Yellow Intermediate	3	1,480	124	40
White Belgian	3	1,040	117	20
Long Scarlet Altringham	3	600	110	..
Mammoth White Intermediate	3	600	110	..
Ontario Champion	3	160	102	40
Scarlet Intermediate	3	160	102	40
Scarlet Nantes	2	1,720	95	20
Long Orange or Surrey	2	1,720	95	20
White Vosges Large Short	2	1,280	88	..

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested. The soil was a clay loam. The first plots were sown on May 19, the second on June 2, and all were pulled on October 4. The yield per acre has been calculated from two rows, each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Red Top Sugar	10	592	343	12	11	1,232	387	12
Improved Imperial	10	328	338	48	13	136	435	36
Danish Red Top	10	64	334	24	14	1,040	484	..
Wanzleben	9	744	312	24	13	400	440	..
Danish Improved	8	632	277	12	10	1,384	356	24
Vilmorin's Improved	8	368	272	48	8	632	277	12

EXPERIMENTS WITH POTATOES.

Although the yield of potatoes this year was slightly under the average of the past four years, every variety germinated well, the growth was a remarkably uniform one and the experiment as a comparative test of varieties was successful.

The average yield of twenty-five of the most productive varieties covering a period of four years, is also given.

The previous crop was fodder corn. There was no injury from rot, and practically all were marketable. The yield per acre has been estimated in each case from the product of one row 66 feet long.

All the varieties were planted on May 22 in rich clay loam without manure and were dug on September 20.

POTATOES—TEST OF VARIETIES.

No.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
1	Dakota Red	Rank	Not ripe	Large	Poor	374	..	Round, red.
2	Delaware	"	"	Medium	Fair	363	..	Long, russet.
3	Seattle	"	"	"	"	348	20	" white.
4	Carman, No. 1	"	"	Large	"	348	20	" "
5	New Variety, No. 1	Fair	"	"	"	344	40	Round "
6	Troy Seedling	"	"	Medium	Poor	337	20	Long "
7	Brownell's Winner	Rank	"	Large	Good	333	40	" red.
8	Seedling, No. 7	"	Sept. 12	Medium	Poor	330	..	Round, red.
9	Lizzie's Pride	Fair	" 12	Large	Good	311	40	Long "
10	Money Maker	Rank	" 8	Small	Fair	311	40	" white.
11	Seedling, No. 230	"	" 10	"	Good	311	40	Round, white.
12	Carman, No. 3	"	" 11	Medium	Fair	308	..	Long "
13	Clarke's No. 1	Fair	" 13	"	"	308	..	" pink.
14	Irish Daisy	Rank	" 11	"	"	304	20	" white.
15	Rural Blush	"	Not ripe	Large	Good	304	20	" red.
16	Northern Spy	Fair	"	Medium	"	304	20	Oval, red.
17	Irish Cobbler	"	Sept. 5	"	Fair	300	40	Round, russet.
18	Uncle Sam	"	Not ripe	Large	"	300	40	Long, white.
19	Early Harvest	"	"	Medium	Poor	297	..	" "
20	Enormous	"	"	"	"	297	..	Flat "
21	Early Six Weeks	Weak	Sept. 5	"	Good	293	20	Oval, red.
22	State of Maine	Fair	Not ripe	Large	Poor	293	20	Long, white.
23	Green Mountain	"	"	Medium	Good	293	20	Oval "
24	Hale's Champion	"	"	"	Poor	293	20	Round "
25	Cambridge Russet	"	Sept. 11	"	Fair	293	20	Long, russet.
26	Early St. George	Rank	" 12	"	Good	293	20	" pinkish.
27	Houlton Rose	Fair	" 11	"	Fair	293	20	Oval, long, red.
28	Columbus	Rank	Not ripe	"	Good	286	..	" "
29	Great Divide	Fair	Sept. 14	"	Fair	286	..	Long, white.
30	Holborn Abundance	Rank	Not ripe	"	Good	286	..	Round, russet.
31	Rose No. 9	Fair	"	Large	Fair	282	20	Long, red.
32	Reeve's Rose	Rank	Sept. 12	Medium	Poor	282	20	Flat, pink.
33	Burnaby Seedling	"	Not ripe	"	Fair	275	..	Oval "
34	Prolific Rose	"	Sept. 10	"	Poor	275	..	Round, red.
35	Gem of Aroostook	"	" 11	"	Fair	271	20	Long, pink.
36	Brown's Rot Proof	"	Not ripe	Large	Good	271	20	" red.
37	Early Michigan	Fair	Sept. 5	Medium	Fair	267	40	" white.
38	Pride of the Market	"	Not ripe	"	Good	264	..	Oval "
39	Dreer's Standard	Rank	"	Small	....	260	20	Round "
40	Lightning Express	"	Sept. 11	Medium	....	260	20	Oval, pink.
41	Quaker City	"	Not ripe	"	Fair	256	40	Flat, white.
42	Sir Walter Raleigh	Fair	"	Large	Poor	256	40	Round "
43	Early Market	"	Sept. 5	Medium	Good	256	40	Oval, pink.
44	Penn. Manor	"	" 14	"	"	256	40	" long, red.
45	Early White Prize	Rank	" 5	"	Fair	253	..	" white.
46	Vanier	Fair	Not ripe	"	"	253	..	" red.
47	Prize Taker	"	Sept. 12	"	Good	253	..	Round, red.
48	Early Pride	"	Not ripe	"	Fair	249	20	Oval "
49	Earliest of All	"	Sept. 5	"	"	249	20	" long, red.
50	Late Puritan	"	" 4	"	"	249	20	Long, white.
51	Vigorosa	"	" 12	"	....	245	40	Flat, red.
52	Hayden's Seedling	"	Not ripe	"	Poor	245	40	Long, white.
53	American Wonder	"	"	"	Good	242	..	"
54	Maule's Thoroughbred	"	Sept. 14	"	"	242	..	Oval, long, red.
55	Harvest King	"	" 12	"	Poor	242	..	Round, white.
56	Early Puritan	"	Not ripe	"	Good	238	20	Long "
57	I. X. L.	"	"	Large	Fair	238	20	" red.
58	Reading Giant	Rank	Sept. 5	Small	"	238	20	Round, red.
59	Livingston's Beauty	Fair	" 14	Medium	Good	238	20	Flat, white.
60	Daisy	"	" 5	"	"	238	20	Oval, long, red.
61	Beauty of Hebron	"	" 5	"	"	238	20	" "
62	Lee's Favourite	"	Aug. 26	"	"	234	40	Round, pinkish.
63	White Beauty	"	Sept. 5	Small	"	231	..	Long, white.
64	Pride of the Table	Weak	Not ripe	Medium	Fair	231	..	Round, pink.
65	Good News	Fair	Sept. 15	"	Good	231	..	Oval, red.
66	Chas. Downing	"	" 5	Small	Wet	231	..	Round, white.
67	Everett	"	" 12	Medium	Fair	231	..	Long, red.
68	Seneca Beauty	"	Not ripe	"	Good	227	20	Flat, pink.
69	Ohio Junior	Weak	Sept. 5	"	Fair	223	40	Oval, red.
70	Rural, No. 2	Fair	Aug. 12	Large	Good	220	..	Flat, round.
71	Queen of the Valley	"	Sept. 8	Medium	"	220	..	" long, red.

POTATOES—TEST OF VARIETIES—*Concluded.*

No.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
72	Early Rose	Weak	Sept. 5	Medium	Fair	220	..	Oval, long red.
73	Empire State	Fair	" 12	"	Good	216	20	" white.
74	Vick's Extra Early	"	Not ripe	"	"	216	20	" pinkish.
75	New Queen	"	Sept. 1	"	"	212	40	Flat "
76	Chicago Market	"	Not ripe	"	"	209	..	Long, white.
77	20th Century	"	Sept. 12	"	Poor	209	..	" russet.
78	Harbinger	"	" 5	"	Fair	205	20	Oval, red.
79	World's Fair	"	Not ripe	"	Good	205	20	Flat, white.
80	American Beauty	Rank	"	Small	Poor	201	40	Long "
81	Clay Rose	Fair	"	Medium	Good	201	40	Red, round.
82	Maggie Murphy	"	"	Large	"	201	40	Long, red.
83	Bovee	Weak	Sept. 5	Medium	Fair	201	40	Oval, pink.
84	Burpee's Extra Early	Fair	Aug. 28	"	"	201	40	" red.
85	Flemish Beauty	"	Sept. 14	"	Good	201	40	" long, red.
86	Pearce's Prize Winner	"	" 11	"	"	198	..	Round, white.
87	Polaris	"	" 8	"	Fair	198	..	Oval, red.
88	Swiss Snowflake	"	Not ripe	Small	"	198	..	Round, white.
89	Honeoye Rose	"	Sept. 5	Medium	Good	190	40	Oval, long, red.
90	Algoma	"	" 8	"	"	190	40	" "
91	Country Gentleman	"	" 5	"	Fair	190	40	Flat, pink.
92	Early Sunrise	"	" 5	"	"	187	..	Oval, long, red.
93	Russell Seedling	"	" 12	Small	Good	187	..	Round, white.
94	Early Fortune	Weak	" 5	Medium	Fair	183	20	Oval, red.
95	American Giant	Fair	" 12	Small	Good	183	20	Long, white.
96	Pearce's Extra Early	"	" 10	Medium	Fair	183	20	" red.
97	Livingston	Weak	Not ripe	"	Good	179	40	" pink.
98	Stourbridge Glory	Rank	"	Small	Fair	176	..	Round, russet.
99	Thorburn	"	Sept. 5	Medium	"	172	20	" pinkish.
100	Early Ohio	Weak	Aug. 20	"	"	168	40	" "
101	Early Northern	"	Sept. 5	"	Good	168	40	Oval, red.
102	Fillbasket	"	Not ripe	"	Fair	165	..	" "
103	General Gordon	Fair	Sept. 15	"	"	165	..	" "
104	Wonder of the World	Weak	" 1	"	Good	165	..	" rose.
105	Bill Nye	"	Aug. 28	"	Fair	161	20	" red.
106	Rochester Rose	Rank	Sept. 5	"	Good	150	20	Long, pink.
107	McIntyre	"	Not ripe	Small	Poor	146	40	" white.
108	Sharpe's Seedling	Weak	Aug. 28	Medium	Good	146	40	Oval, pink.
109	Record	Rank	Not ripe	Small	Fair	99	..	Long, white.

AVERAGE YIELD of Potatoes during four Years.

Variety.	Years included.	Average Yield per Acre.		Quality.	Colour.
Seedling No. 7	1897-98-99-1900	402	25	Good	Red.
Delaware	" "	385	..	Fair	Russet.
Dreer's Standard	" "	371	5	Good	White.
State of Maine	" "	356	7	"	"
Clarke's No. 1	" "	353	50	Fair	Pink.
New Variety No. 1	" "	352	55	Poor	White.
Green Mountain	" "	351	5	"	"
Late Puritan	" "	350	10	"	"
Irish Daisy	" "	337	20	"	"
Burnaby Seedling	" "	331	50	"	Pink.
Chicago Market	" "	331	50	Good	White.
Money Maker	" "	330	..	Poor	"
Troy Seedling	" "	330	..	"	"
Lizzie's Pride	" "	327	15	Good	Red.
Dakota Red	" "	324	30	Poor	"
Vanier	" "	322	50	Good	"
Great Divide	" "	318	5	"	White.
Rural Blush	" "	314	25	Fair	Red.
Clay Rose	" "	310	45	Poor	"
Flemish Beauty	" "	309	50	Fair	"
Brownell's Winner	" "	304	20	"	"
General Gordon	" "	303	30	Good	"
Carman No. 3	" "	297	55	Fair	White.
Northern Spy	" "	292	25	Poor	Red.
Seedling No. 230	" "	292	25	Good	White.
Uncle Sam	" "	291	50	Poor	"
American Giant	" "	289	40	Good	"

GRASSES.

Owing to the severe drought in spring and early summer, the yield of hay on the Experimental Farm was the smallest on record, the older fields failing to produce enough to pay for cutting. A newly-seeded field of four acres, in a moist situation, gave the best returns, viz., 1 ton 589 pounds per acre of Awnless Brome grass. The abundant rains later in the season produced an aftermath which was rank in growth, and some of it was sufficiently tall for mowing, but the hay from it was not found equal in quality to the first cutting.

The only clover which reached a sufficient height for mowing was Lucerne or Alfalfa. A plot of this grew 27 inches high, but accurate returns of the yield could not be obtained owing to heavy rains at the time of curing.

SEEDING BROME ON VERY SANDY LAND.

It being desirable to seed down an exposed field of thirteen acres of light sandy land with Brome Grass, and wishing to avoid loss from drifting soil, the plan of ploughing in the seed lightly with a three-furrow gang plough was tried with success. The field had been summer-fallowed during 1899, and early in April the Brome Seed was sown broadcast alone, at the rate of 15 pounds per acre ; this was ploughed in at once two inches deep, and left quite rough. The seed remained dormant until the June rains, but the soil did not drift. In July the young plants appeared above ground, and by autumn the field gave abundant pasture.

GRASS AS A PREVENTIVE OF DRIFTING SOIL.

The past season was exceptional for the large amount of injury done through drifting soil, thousands of acres of crop, both east and south-west of this place, being almost entirely destroyed from this cause.

On the Experimental Farm the benefits of seeding to grass was very evident. Knolls and other exposed spots which, in the early history of the farm, were often so badly blown as to lose the seed, were so protected by the fiber of grass plants ploughed under in former years, that the injury was scarcely noticeable.

It is evident that one of the best preventives of injury from drifting soil is to seed down to grass every few years.

MILLETS.

Seven varieties of millets were grown this year, although some of them failed to germinate until after the June rains. They all made a heavy return.

From several years' experience, it appears that millets are quite reliable in this climate if sown on summer-fallow, or on any naturally moist land, newly ploughed. On dry land, or on land which has been ploughed for some time, the millet seed germinates so slowly that the weeds usually choke it out. The Japanese variety was sown in drills 9 inches apart, the others 7 inches apart ; the size of the plots was one-twentieth of an acre, and the soil was a clay loam which had been summer-fallowed.

Millets—Test of Varieties.

Variety.	When sown.	When cut.	Height.	Yield per Acre.
			Inches.	Tons Lbs.
Italian or Indian	May 25	Sept. 3	48	5 480
Golden	" 25	" 3	52	4 1,978
Hungarian	" 23	" 3	46	4 600
French White	" 23	" 3	55	3 1,880
Japanese	" 23	" 3	52	2 1,480
Algerian	" 25	" 3	61	1 1,360
Pearl	" 23	" 3	46	1 1,280

BROOM CORN AND SORGHUM.

One plot each of these were grown for fodder purposes. Both made a large and rapid growth, but owing to the excessive rains, they did not cure well. They were both sown in drills 28 inches apart; the size of the plots was one-twentieth of an acre, the soil a clay loam which had been summer-fallowed.

Broom Corn.

Variety.	When sown.	When cut.	Height.	Yield dry per Acre.
				Tons Lbs.
Broom Corn	May 25	Sept. 3	82	2 1,617

Sugar Cane or Sorghum.

Variety.	When sown.	When cut.	Height.	Yield per Acre.
			Inches.	Tons Lbs.
Early Amber	May 26	Sept. 3	72	3 1.870

EXPERIMENTS WITH SOJA BEANS AND HORSE BEANS.

Both of these were sown on May 19, and germinated at once; but the Soja Beans were completely destroyed by the frost of June 8, and the Horse Beans were uninjured. They made a rapid growth in spite of the drought, and when cut on September 17, they were well loaded with beans, nearly ripe.

The land was summer-fallowed. The size of the plots was one-fortieth of an acre each.

HORSE BEANS SOWN AT DIFFERENT DISTANCES.

Variety.	Sown.	Rows.	Height.	Cut.	Yield per acre green.	
					Tons.	Lbs.
English Horse Beans	May 19	21 inches apart	40	Sept. 17	6	400
" " "	" 19	28 " "	40	" 17	6	800
" " "	" 19	35 " "	40	" 17	7	

SAND VETCH.

A plot of this plant was sown, but the germination was so uneven that accurate returns of the yield could not be obtained. The few plants that grew had a very spreading habit, and would have been difficult to harvest. The length of the plants was 32 inches. The soil was a clay loam, summer-fallowed.

PROLIFIC COW PEA.

A one-twentieth acre plot of this plant was sown, but from some unknown cause very few seeds germinated. The plants which grew were only 11 inches high, and resembled Wax Beans, but they did not reach the blossoming stage. The soil was a clay loam, summer-fallowed.

SUNFLOWERS.

About half an acre of Mammoth Russian Sunflowers were grown on the farm this year. The soil was a clay loam, summer-fallowed. They were sown on May 30, but owing to the dry season they did not germinate until the June rains, and only about 25 per cent ripened before severe frost. The hail-storm on August 17, cut off a large proportion of the heads. They were harvested on October 10. The height was eight feet, and the yield 3 tons 40 pounds of green heads per acre.

CATTLE.

The cattle on the Brandon farm have kept in good health during the past year, and the herd now consists of the following animals :—

Name of Animal.	Breed.	Age.	Weight.
			Pounds.
Lord Lassie	Shorthorn	3 years	1,670
Violet	"	4 "	1,260
Mary of Brandon	"	14 months	710
Esther	"	3 years	1,180
Prairie Buttercup	"	7 months	465
Eva	"	5 "	350
Prince Charlie	Ayrshire	6 "	445
Dandy	"	11 years	1,350
Primrose	"	2	1,065
Sandy	"	14 months	1,050
Bonnie Doon	"	10 "	510
Queen of Brandon	Holstein	2 years	1,170
Siepkje of Brandon	"	2 "	1,320
Brandon Friar	"	14 months	950
Richard Lyons	Guernsey	3 years	1,820
Lady Jane Grey	Grade	12 "	1,280
Pansy	"	6 "	1,260
Violet	"	4 "	1,345
Rose	"	2 months	300
Reddy (Steer)	"	22 "	950
Dick "	"	13 "	840

EXPERIMENT IN FEEDING STEERS.

DEHORNING AND ITS EFFECTS ON CATTLE.

Fifteen steers were selected for this test. They were apparently Shorthorn grades. Four in each lot were coming three years old and one coming four years old, when the feeding started. They fairly represented the better class of animals raised in the province. These were divided into three groups of five each. Ten of these were dehorned, and five were not dehorned. One of the dehorned groups was fed in a stall loose ; the others were tied up alongside of the group with horns.

The dehorning operation was performed as follows : The animal was placed in a strongly built stanchion, a stout halter put on and a rope run from the halter to a ring in the floor, the hair at the back of the horn was turned back and the cut made so that the hair lapped over the scar. A common carpenter's saw newly sharpened, was used. The cattle were kept in the barn after the operation. They all bled profusely, but only one or two lost their appetite, and these only for a meal or two. The wounds in every instance healed quickly and without any offensive odour.

The ten animals were tied in double stalls with chains. The five untied animals were confined in a stall 10 feet by 28 feet and were fed in a trough running the length of the stall.

When purchased on November 20, 1899, the steers cost 3½ cents per pound live weight, and sold on May 12, 1900, for 3¾ cents per pound.

Owing to the comparatively low price of fat cattle in the spring, all were fed at a loss, but the experiment, as a test of dehorning, was a very successful one, and would lead us to the conclusion that dehorning has very little effect on the animal either one way or the other.

RATIONS FED.

First Period—November 24 to December 15, 1899.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 lbs.	10 lbs.	1,050 lbs.
Hay	25 ″	5 ″	525 ″
Ensilage	100 ″	20 ″	2,100 ″
Chop	35 ″	7 ″	735 ″

Second Period—December 15 to January 12, 1899.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	35 ″	7 ″	980 ″

Third Period—January 12 to February 9, 1900.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	40 ″	8 ″	1,260 ″

Fourth Period—February 9 to March 9, 1900.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	45 ″	9 ″	1,260 ″

Fifth Period—March 9 to April 6, 1900.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	50 ″	10 ″	1,400 ″

COMPARATIVE GAINS.

Dehorned—Tied.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 24	5,206 Lbs.		
Weight end of 1st period	Dec. 15	5,324 "	118 Lbs.	
" 2nd "	Jan. 12	5,563 "	239 "	
" 3rd "	Feb. 9	5,757 "	194 "	
" 4th "	Mar. 9	5,934 "	177 "	
" 5th "	Apl. 6	6,156 "	222 "	950 Lbs.

Dehorned—Loose.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 24	5,240 Lbs.		
Weight end of 1st period	Dec. 15	5,534 "	294 Lbs.	
" 2nd "	Jan. 12	5,762 "	228 "	
" 3rd "	Feb. 9	5,914 "	152 "	
" 4th "	Mar. 9	6,004 "	90 "	
" 5th "	Apl. 6	6,204 "	200 "	964 Lbs.

Horned.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 24	5,222 Lbs.		
Weight end of 1st period	Dec. 15	5,489 "	267 Lbs.	
" 2nd "	Jan. 12	5,650 "	161 "	
" 3rd "	Feb. 9	5,800 "	150 "	
" 4th "	Mar. 9	5,938	138 "	
" 5th "	Apl. 6	6,190 "	252 "	968 Lbs.

Cost of Feeding Each Lot of Five Steers.

6,650 pounds of straw		
3,325 "	hay at $4.00 per ton	$ 6 65
13,300 "	ensilage at $2.00 per ton	13 30
5,495 "	chop at 68¾c per 100	37 78
		$57 73

Description of Fodder.

The hay was threshed Brome Grass.

The ensilage was made from early ripening corn.

The chop consisted of ½ oats, ¼ wheat screenings and ¼ barley.

Summary of Results.

—	First Cost of Steers.	Value of Feed Consumed.	Price Sold For.	Loss.
Dehorned, tied	$182 21	$57 73	$230 85	$9 09
" loose	183 40	57 73	232 65	8 48
Horned	182 77	57 73	232 12	8 38

SWINE.

The herd of swine on the farm continues in good health, and consists of the following animals :—

Name.	Breed.	Age.	Name.	Breed.	Age.
Royal Victor......	Berkshire	2 years.	British Prince	Tamworth..	13 months.
Minnie Merle 3rd..	"	19 months.	6 sucking pigs.....	"	3 "
1 pig....	"	8 "	Squire	Chester White......	3 years.
3 sucking pigs......	"	2 "	7 sucking pigs.....	Tamworth, Chester White.........	2 months.
Sergeant Major....	Tamworth..........	20 "	Brandon Chief....	Improved Yorkshire.	7 "
Amy's Choice 2nd .	"	2 years.	1 sow	" " ..	7 "
Nina of Brandon ..	"	2 "			

SWINE FEEDING.

There is an increasing demand throughout the province for lean pork to replace the heavy fat meat generally supplied, and it was thought advisable to ascertain whether a more acceptable article could be obtained from using a boar of the so-called bacon breeds with Berkshire sows.

The dam used was a pure bred Tamworth, and the sire a very typical Berkshire. The ten pigs from this cross were healthy, vigorous animals, with deep and long sides and suitable for bacon purposes. Two of these and two of the pure bred Berkshires of the same age were fed for seven weeks with a mixture of ground grain composed of 50 per cent of oats, 25 per cent of barley, and 25 per cent of wheat screenings. All were confined in pens.

From the accompanying table it will be noticed that the meat from the cross breeds cost less to produce. The meat from these pigs was decidedly the best, being lean with only a few streaks of fat running through it, while the pure bred Berkshire meat was thick and very fat.

Pure Bred Berkshires—

	Dr.	Cr.
Cost of two pigs, 202 lbs., at 4¼c. per lb........	$8 58	
Cost of feed....	2 92	
Sold 276 lbs. at 4¼c. per lb.....		$11 73
Profit on two pigs.......	23	
	$11 73	$11 73

Cost per 100 lbs, $3.94.

Tamworth Berkshire Crosses—

	Dr.	Cr.
Cost of two pigs, 196 lbs., at 4¼c. per lb........	$8 33	
Cost of feed......	3 41	
Sold 316 lbs at 4¼c. per lb....		$13 43
Profit on two pigs......	1 69	
	$13 43	$13 43

Cost per 100 pounds, $2.84.

BROME GRASS PASTURE FOR PIGS.

Last year an effort was made to find out the value of Brome grass pasture for fattening pigs, but owing to unforeseen circumstances it was found impossible to finish the test. This year the test was more successful, and the results given below show that this kind of pasture is excellent for the purpose.

The animals selected were Chester White and Tamworth crosses, and were all from one litter. The feeding commenced when the pigs were two months old, and directly after weaning.

The pasture field was seeded to brome grass in August, 1898. The area was one acre, and it not only gave abundance of pasture for the four pigs, but about two tons of hay was saved in addition. The pigs were evidently very fond of the grass, and were found feeding on it at all times of the day.

For the first three months both lots were fed on a mixture of soaked ground grain, composed of half oats, quarter barley and quarter wheat screenings, and during the last three months on ground pease alone.

The penned animals were fed all the grain they would eat up clean, but the pastured pigs only received sufficient to keep them steadily gaining in flesh without making them independent of the pasture.

Cost of Grain Fed to Pigs in Pasture.

156 pounds of barley at ½ cent per pound	$ 0 78
156 pounds of wheat screenings at ½ cent per pound	0 78
312 pounds of oats at ¾ cents per pound	2 34
325 pounds of pease at 1 cent per pound	3 25
	$ 7 15

Cost of Grain Fed to Pigs without Pasture.

231 pounds of barley at ½ cent per pound	$ 1 15
231 pounds of wheat screenings at ½ cent per pound	1 15
462 pounds of oats at ¾ cent per pound	3 46
425 pounds of pease at 1 cent per pound	4 25
	$ 10 01

SUMMARY.

Pastured Pigs—	Dr.	Cr.
First cost of pigs, 117 pounds at 4½ cents	$ 5 26	
Cost of feed	7 15	
Sold 510 pounds at 4½ cents		$ 22 95
Profit on four pigs	10 54	
	$ 22 95	$ 22 95

Without Pasture—	Dr.	Cr.
First cost of pigs, 115 pounds at 4½ cents	$ 5 17	
Cost of feed	10 01	
Sold 481 pounds at 4½ cents		$ 21 64
Profit on pigs	6 46	
	$ 21 64	$ 21 64

POULTRY.

The fowls have kept quite healthy and twenty-six chickens were raised during the year. The flock now consists of 13 White Plymouth Rocks, 21 Black Minorcas and 16 Light Brahmas. Some experiments in feeding were commenced this autumn but were not finished in time to be included in this report.

BEES.

The five colonies placed in the house cellar last fall, wintered without loss, but again we have had a poor year for bees. Owing to the very light rainfall very few wild flowers blossomed in the early part of the season, and the continued rains in late summer prevented the bees working to any extent on late flowers. The amount of surplus honey gathered averaged only about 5 pounds per hive, spring count. Four new swarms were hived during the summer.

FRUITS.

APPLES.

The trees of the Wild Siberian Crabs (*Pyrus baccata aurantiaca, Pyrus baccata lutea* and *Pyrus prunifolia*), made a magnificent showing of bloom during the past spring, and hopes were entertained that a large crop of fruit would be harvested. The frost on the evening of June 8, however, almost totally destroyed the young fruit and only very few specimens matured. The fruit of these varieties makes a capital preserve, and the trees themselves are invaluable as stocks for grafting.

The frost mentioned above, also destroyed the blossoms of the Transcendent Crab mentioned in last year's report, as the only survivor of a consignment of ten trees received in 1899 from the Central Experimental Farm, and no fruit was gathered this season.

CROSS-BRED APPLES.

With the object of producing hardy apples for the North-west, the Director, Dr. Wm. Saunders, has during the past five years made a number of crosses of hardy apples, such as Wealthy and Tetofsky, with two of the hardy Siberian Crabs, *Pyrus baccata* and *Pyrus prunifolia*, both of which are perfectly hardy here. The experiment was successful and a number of seedlings resulted. Some of these have already fruited at the Central Experimental Farm, Ottawa, and have produced some very good sized fruit, showing a wonderful improvement on the female parents. A number of these seedlings, together with root grafts were received at Brandon during 1898-99 for the purpose of testing their hardiness here, and the results up to the present have been very satisfactory. Following will be found a full analysis of the test at this farm up to the fall of 1900. It will be noted that a large proportion of the grafted roots received in 1899 did not make any start, which fact was attributable to the very dry weather experienced during the spring months. The seedlings of all the consignments did much better than the root grafts. An interesting and detailed account of the work of making these crosses will be found in the director's annual report for 1899, which will be forwarded on application.

Female Parent.	Male Parent.	Record No.	Date Received.	Number Received.	Number Alive. 1900	Number Vigorous. 1900	Seedling or Graft.	Remarks.
Pyrus baccata...	Talman's Sweet.		1898	9	9	9	Seedlings...........	
" ...	Wealthy....		1898	7	6	6	"	
" ...	Red Astrachan		1898	4	2	2	"	
" ...	Tetofsky		1898	12	12	12	"	
" ...	Pewaukee............		1898	6	5	5	"	
" ...	Excelsior		1898	2	2	2	"	
" ...	Wealthy		1898	3	0	0	Graft on P. baccata...	Did not start.
" ...	Swayzie Pomme Grise		1898	7	5	5	Seedlings....	
" ...	Yellow Transparent...		1898	2	1	1	"	
" ...	Martha........... .		1898	3	3	3	"	
Pyrus prunifolia.	Pewaukee............		1898	3	0	0	"	
Pyrus baccata...	McMahan White		1898	1	1	1	"	
" . .	Duchess.......		1898	1	0	0	"	Did not start.
" ...	Wealthy........	118	1898	7	2	2	Grafted on P. baccata..	3 did not start.
" ...	Red Anis.......	165	1898	2	1	1	" "	
" ...	Hyslop	30	1898	1	I	1	" "	
" ...	Tetofsky(Charles)	46	1898	2	0	0	" "	Did not start.
" ...	Wealthy..	125	1898	4	0	0	" "	"
" ...	Duchess	142	1898	3	0	0	" prunifolia	"
" ...	Tetofsky	45	1898	1	0	0	" baccata...	"
" ...	"	116	1898	3	1	1	" prunifolia	2 did not start.
" ...	Red Anis	164	1898	3	2	2	" baccata...	
" ...	Orange Crab....	16	1898	3	1	0	" prunifolia	Killed back ½.
" ...	Hyslop "	12	1898	3	3	3	" baccata...	
" ...	Orange "	1	1898	3	0	0	" prunifolia	Did not start.
" ...	Wealthy.. . ..	127	1898	5	1	1	" baccata...	4 did not start.
" ...	Tetofsky........	53	1898	2	0	0	" " ...	Did not start.
" ...	Hyslop Crab....	107	1898	2	0	0	" prunifolia	"
" ...	Red Anis	161	1898	4	2	2	" " ..	1 "
" ...	TranscendentCrab.	19	1898	3	1	0	" " ..	2 " 1 killed ½.
" ...	"	29	1898	4	1	1	" " ..	
" ...	Red Anis	162	1898	4	0	0	" baccata...	Did not start.
" ...	Tetofsky........	64	1898	1	0	0	" " ..	"
" ...	Wealthy........	122	1898	3	2	2	" " ...	1 "
" ...	Duchess	141	1898	2	1	1	" " ...	1 "
" ...	Tetofsky.	79	1898	2	0	0	" " ...	1 "
" ...	Wealthy........	132	1898	2	1	1	" " ...	1 "
"	cross....	105	1899	5	1	1	Grafted...............	
"	"	142	1899	5	2	1	" ...."......	
"	"	118	1899	5	0	0	"	
" ...	Ball's Winter Crab....		1899	8	8	8	Seedlings............	
" ...	Beautiful Arkad......		1899	4	3	2	"	
" ...	Krimskoe		1899	10	8	8	"	

Variety.	Record No.	Date Received.	No. Received.	No. Alive 1900.	No. Vigorous. 1900.	Seedling or Grafted.	Remarks.
Pyrus baccata cross	64	1899	5	2	2	Grafted	
" "	79	1899	5	1	1	"	
" "	16	1899	3	1	1	"	
" Charles..	46	1899	5	1	1	"	
" cross	102	1899	4	1	0	"	Weak growth.
" "	112	1899	4	0	0	"	
" "	122	1899	4	1	1	"	
" "	164	1899	4	2	2	"	
" "	19	1899	4	0	0	"	
" "	30	1899	4	1	1	"	
" "	107	1899	5	3	3	"	
" "	117	1899	4	0	0	"	
" "	163	1899	5	3	2	"	One killed back $\frac{3}{4}$
" "	165	1899	3	0	0	"	
" "	161	1899	4	2	2	"	
" " ...	125	1899	5	3	3	"	
" "	127	1899	5	3	3	"	
" "	162	1899	5	2	2	"	
" "	53	1899	4	3	3	"	
" "	116	1899	2	1	1	"	
" "	132	1899	3	1	1	"	
" "	137	1899	2	0	0	"	

CROSS BRED APPLES PLANTED 1898.

——	No. planted.	No. alive, 1900.	Percentage.
Seedlings planted in 1898....................................	57	46	$80\frac{10}{19}$
Grafts	72	20	$27\frac{7}{9}$

——	No. started.	No. alive, 1900.	Percentage.
Counting out grafts that did not start..............................	30	20	$66\frac{2}{3}$
Grafts on Pyrus baccata started	18	14	$77\frac{7}{9}$
" " Prunifolia started..	12	6	50

——	No. planted.	No. alive. 1900.	Percentage.
Seedlings planted in 1899....................................	22	19	$86\frac{4}{11}$
Grafts planted in 1899..	114	34	$29\frac{47}{57}$

A careful perusal of the above tables will show decidedly gratifying results ; and it seems reasonable to hope that experiments conducted along these lines, will go a long way towards eventually solving the apple problem in the North-west.

STANDARD APPLES.

Reference is made on page 304 of the 1898 report for experimental farms to specimens of the Tonka and Wealthy apples growing on this farm. The four trees in question (two of each variety) were received from Mr. A. P. Stevenson, of Nelson, Man., in 1896, and were grafts from trees which had proven hardy at his establishment at Nelson, which is only 900 feet above sea level. All are alive at this date, and two trees (one of each variety) look especially vigorous ; and up to the present show no sign of injury. In all probability they will produce flowers next season.

CRAB APPLE SEEDLINGS.

Of fifty trees of Martha Crab seedlings, planted in the crab apple orchard in 1898, thirty-nine were alive and in good condition in the fall of 1900

TOP GRAFTS.

A few scions of Blush Calville and White Rubets, and a crab apple unnamed, were received during the summer of 1900, from His Grace the Archbishop of Rupert's Land, and were grafted on *Pyrus baccata*. Owing to the very strong winds experienced, several worked loose and failed to unite. Two scions of Blush Calville and one from the unidentified crab apple effected a junction, and were in good condition on the approach of winter. Both of these varieties have proven hardy and borne fruit in Winnipeg.

PLUMS.

Owing to injury by spring frosts, the plum crop was almost a total failure during the past season. The trees flowered heavily and the fruit set well, but was completely blackened by the frost of June 7. No native fruit was gathered, and the few fruits left undestroyed on the improved varieties were again frozen before ripening.

RASPBERRIES.

The raspberry crop was an entire failure during the past season, the fruit failing to set on account of the prolonged dry weather in the spring.

SAND CHERRIES *(Prunus pumila)*.

Owing to the unfavourable climatic conditions which prevailed during the past season, the selected Sand Cherries, mentioned in previous reports, did not produce fruit, but made a fair growth.

GOOSEBERRIES.

The nine varieties of gooseberries under test at this farm came through the winter in good condition, and produced a small crop of fruit.

SASKATOON *(Amelanchier alnifolia)*.

It is pleasing to record a fine crop of this useful native fruit during the past summer. The berries were large, free from disease, and of fine flavour.

CURRANTS.

The currant was the only one of the small fruits which gave satisfaction during the past season, and even this was not by any means up to the average standard. Following will be found arranged in tabular form the notes taken during the year on this crop :—

Variety.	Colour.	Date of ripening.	No. of trees.	Yield.		Total.
				1st picking.	2nd picking.	
				Lbs.	Lbs.	Lbs.
North Star	Red	July 3 to 19	6	11½	....	11½
Red Cherry	"	"	6	7½	1½	9
Raby Castle	"	"	4	7½	3½	11
Red Dutch	"	"	4	12½	1½	14
La Versailles	"	"	2	2½	½	3
No. 22 Seedling	"	"	4	11	....	11
Victoria	"	"	4	10½	5	15½
Fertile D'Angers	"	"	4	4	½	4½
Cherry	"	"	4	15½	3½	19
Prince Albert	"	"	2	2	2½	4½
Pomona	"	"	6	13	½	13½
Climax	Black	July 6 to 15	4	6	....	6
Ethel	"	"	4	9	....	9
Black Naples	"	"	4	1	....	1
Kerry	"	"	3	5	....	5
Lee's Prolific	"	"	4	5	....	5
Charmer	"	"	4	4	....	4
Beauty	"	"	4	16½	....	16½
Clipper	"	"	4	....	....	4
Winona	"	"	4	4	....	4
Perry	"	"	3	3	....	3
Stewart	"	"	4	3	....	3
Eclipse	"	"	3	2	....	2
Monarch	"	"	4	3½	....	3½
Standard	"	"	4	1½	....	1½
Eagle	"	"	4	3½	....	3½
White Dutch	White	"	4	10½	....	10½
White Grape	"	"	4	6	....	6

FOREST TREES AND SHRUBS.

The effects of the past unfavourable season were visible in this division, as well as in other branches of farm work. Though the well-established trees do not show bad results in a marked degree, seedlings, cuttings, and newly-transplanted specimens, were more or less adversely affected by the long-continued drought of the spring months. A much larger percentage of transplanted trees succumbed during the past year than has been recorded for some time, while the germination of seedlings, and the growth of cuttings, were almost failures ; not more than 10 per cent of the former, and less than 5 per cent of the latter, starting to grow. The avenue trees and large hedges, however, looked quite as well as usual, and though much damage from insect pests was reported in the immediate vicinity to trees of the same varieties of which these are composed, we are pleased to be able to report perfect immunity from this trouble. Taken altogether, the season was a very unfavourable one for this branch of work.

The following is a list of trees received during 1899, and which have stood one winter at this farm :—

Abies balsamea variegata (Variegated balsam spruce).
Ampelopsis Quinquefolia hirsuta (Self-fastening virginia creeper).
Berberis Neuberti (Neubert's barberry).
" *hybrid No. 2* (Hybrid barberry).
" *aquifolium murrayana.*
" *sibirica* (Siberian barberry).
" *japonica* (Japan barberry).
Betula pumila (Dwarf birch).
Cephalanthus occidentalis (Button bush).
Celastrus articulatus (Japanese bitter sweet).
Cratægus coccinea (Yellow fruited Hawthorn).
Cytisus nigricans longispicatus.
" *sessilifolius.*
Cornus sanguinea (Red dogwood).
Cotoneaster laxiflora.
Euonymus nanus obovasus.
Fraxinus longicuspis (Japan ash).
Genista tinctoria sibirica.
Juniperus chinensis = J. Japonica.
" *communis fastigiata var. suecica.*
" *communis fastigiata var. hibernica.*
" *sabina argentea.*
" *glauca.*
" *virginiana elegans.*
" " *pyramidalis = J. fragrans.*
" " *Schotti.*
" *communis aurea* (Golden Juniper).
Larix Europæa (European larch).
Laburnum Adami.
" *alpinum* (Alpine laburnum).
Lonicera Xylosteum (Upright Fly Honeysuckle).
" *sempervirens* (Scarlet Trumpet honeysuckle).
" *hirsuta* (Hairy honeysuckle).
Ostrya Virginica (American Hornbeam).
Picea excelsa aurea (Golden Norway spruce).
" " *pendula* (Pendulous Norway spruce).
" " *pyramidalis* (Pyramidal Norway spruce).
" *nigra* (Black spruce).
" *obovata Schrenkiana* (Schrenk's spruce).
Pinus strobus (White pine).
" *montana* (Mountain pine).
Pinus austriaca (Austrian pine).
" *mughus* (Dwarf mountain pine).
Pyrus rotundifolia (Round-leaved pyrus).
" *betulæfolia* (Birch-leaved pyrus).
" *aucuparia* (European mountain ash).
" *Maulei* (Maule's Japanese quince).
Prunus Maximowiczii.
" *maritima* (Beach plum).
" *tomentosa.*
" *demissa* (Western wild cherry).
" *pendula japonica* (Japan cherry).
Philadelphus Lewisii = P. nivalis.
" *Ketelecrii.*
" *hybridus Lemoinei.*
" *hybridus Lemoinei Boule d'Argent.*
" *cordifolius.*
" *hirsutus.*
Periploca græca.
Photinia variabilis arguta.
Quercus rubra americana (Red American oak).
" *pyramidalis* (Pyramidal oak).
" *coccinea* (Scarlet oak).
" ? (Japanese oak).
Rhamnus crenata.
Rosa villosa pomifera.
" *agrestis.*
" *canina macrantha*
" *californica.*
" *lucida.*
" *lucida grandiflora.*
" *nutkana.*
" *rugosa.*
" *tomentosa* (Downy-leaved rose).
Rhus cotinus atropurpurea.
Ribes alpinum pumilum (Dwarf alpine currant).
Sambucus nigra virescens.
" *nigra semperflorens.*
Symphoricarpus Heyeri.
Syringa pekinensis (Pekin lilac).
" *alba grandiflora* (Large-flowered white lilac).
Spiræa bracteata.
Thuya occidentalis pyramidalis.
" " *Columbia.*
" " *Caucasica.*
" " *pigmaea.*

FOREST TREE SHELTER BELT.

The thinning out of deciduous trees, in places where they were crowding out the evergreens, is still being continued, and a considerable amount of work was done in this direction during the past season. The good effects of this was very visible in the more vigorous condition of the evergreens.

HEDGES.

Great interest is taken by visitors in the hedges, a long row of which is planted alongside the main avenue, and is, perhaps, one of the greatest attractions of the farm, as well as the subject of numerous inquiries. Everyone apparently recognizes the great importance of wind breaks in our open country. The large hedges surrounding the shelter blocks, composed of native maple *(Negundo aceroides)*, Sharp-Leaved Willow *(Salix acutifolia)*, Green Ash *(Fraxinus pennsylvanica lanceolata)*, American Elm *(Ulmus americana)*, Russian Poplar *(Populus berolinensis)*, and Cottonwood *(Populus deltoidea)*, continue to do well, with the following exceptions. The Cottonwood is killed to the ground by the rust previously noticed as attacking the leaves of this tree of late years. The Russian Poplar is showing signs of deterioration, principally by losing its lower branches, this tree evidently not standing close planting.

A portion of the Sharp-leaved Willow hedge, situated in a somewhat dry location, has also killed back considerably ; the balance, however, is in good condition. Of the other varieties listed above, the Native Maple seems best adapted to fulfil the requirements of a hedge plant, as in its native state it branches close to the ground, and does not readily kill out by crowding. Perhaps the most satisfactory hedge growing on this farm is one of the Native Spruce *(Picea alba)*, planted in 1893, on the hillside east of the superintendent's house. This is now an almost impenetrable hedge, ten feet high. and the fact of its being an evergreen increases its value, and makes it very attractive during the winter months. A hedge of *Acer Ginnala* (Asiatic Maple), planted in the same year, is generally regarded as one of the best dwarf ornamental hedges, and is much admired by visitors on account of its symmetry and the beauty of its foliage. The most serviceable deciduous hedge is the Siberian Pea Tree *(Caragana arborescens)*, also planted in 1893, on the hillside west of the superintendent's house. It is very dense, and is covered in the spring with beautiful laburnum-like flowers, and readily submits to pruning into any shape desired. It is also a rapid grower, can be easily propagated from seed, and is thoroughly hardy, rendering it invaluable as a hedge plant for the north-western country.

Experiments were commenced in 1895 with the view of testing the adaptibility of various trees and shrubs for this purpose, which has since been continued. The following list contains the result of this work to date, with notes thereon, each experimental hedge being 60 feet in length :—

Number.	Botanical Name.	Common Name.	When Planted.	Height 1900.	Width 1900.	Remarks.
				Ins.	Ins.	
1	Pyrus baccata aurantiaca	Wild Siberian Crab	1898	36	24	A somewhat thin hedge.
2	Lonicera tatarica splendens	Tartarian Honeys'kle	1898	33	27	A very ornamental hedge.
3	Caragana mollis glabra	Glabrous Pea Tree	1895	39	20	A fine medium hedge.
4	Artemesia abrotanum	English Old Man	1898	33	42	A fine dwarf hedge.
5	Shepherdia argentea	Buffalo Berry	1898	30	27	A promising hedge.
6	Rosa rugosa	Japan Rose	1898	30	30	Compact, but suckers badly.
7	Celtis occidentalis	Button Bush	1898	30	27	Not promising.
8	Ligustrum amurense	Amur Privet	1898	27	24	A very promising hedge.
9	Spiraea Douglasii	Douglas Spirea	1898	30	18	Very ornamental.
10	Syringa josikea	Josika's Lilac	1898	30	20	A good ornamental hedge.
11	Cratægus coccinea var. Sullivantii	Native Hawthorn	1897	27	16	Very small as yet.
12	Lonicera albertii	Albert's Honesuckle	1898	20	48	Needs trelissing.
13	Fraxinus pennsylvanica lanceolata	Green Ash	1898	45	18	Somewhat thin.
14	Prunus americana	Wild Plum	1897	33	21	Small as yet.
15	Acer Ginnala	Asiatic Maple	1897	36	24	Fine dwarf hedge.
16	Rhamnus frangula	Buckthorn	1897	36	30	Very promising.
17	Caragana grandiflora	Siberian Pea Tree	1898	33	20	A fine hedge.
18	Salix britzensis	Red Willow	1896	63	42	A good looking hedge.
19	Thuya occidentalis	Arbor Vitae	1899	16	18	Very small as yet.
20	Artemesia abrotanum tobolskianum	Siberian Old Man	1895	72	60	A quick growing windbreak.
21	Vacant					
22	Larix occidentalis	American Larch	1897	46	30	Very promising.
23	Salix laurifolia	French Laurel leaved Willow	1897	60	42	Not promising.
24	Salix voronesh	Voronesh Willow	1898	60	42	A good hedge.
25	Rosa rubrifolia	Red leaved Rose	1897	33	27	Suckers badly.
26	Caragana arborescens	Siberian Pea Tree		51	33	One of the best medium hedges.
27	Cotoneaster vulgaris	Common Cotoneaster	1897	33	33	Promising.
28	Lonicera tatarica elegans	Tartarian Honeys'kle	1897	41	30	Very ornamental.
29	Picea alba	Native White Spruce		30	24	Small as yet.
30	Salix laurifolia 'true'	Laurel leaved Willow	1897	60	42	A fine hedge.
31	Ribes aureum	Flowering Currant	1897	44	30	A dwarf compact hedge.
32	Negundo aceroides	Native Maple		55	44	A useful quick growing hedge.

Number.	Botanical Name.	Common Name.	When Planted.	Height 1900.	Width 1900.	Remarks.
				Ins.	Ins.	
33	Spiraea opulifolia aurea.....	Yellow Ninebark....	1895	30	30	A beautiful hedge, rather tender.
34	Spiraea opulifolia..........	Ninebark..........	1895	42	38	" " very hardy.
35	Populus tremuloides.	Native Aspen.	1895	42	27	Very promising.
36	Prunus pennsylvanica	Pin Cherry	1895	54	36	"
37	Corylus americana.........	Hazel Nut..........	1895	28	20	Too thin.
38	Amelanchier alnifolia	Saskatoon	1895	30	22	Not a first class hedge.
39	Rosa Sayi................ ..	Native Rose........	1895	40	30	Suckers badly.
40	Spiraea salicifolia...........	NativeMeadowSweet	1895	38	30	A most symetrical hedge.
41	Symphoricarpus occidentalis	Snowberry..........	1895	26	24	" "
42	Elaeagnus argentea.........	Wolf Willow..	1895	32	22	A promising hedge.
43	Cornus stolonifera..........	Dog Wood..........	1895	48	42	" "
44	Syringa vulgaris............	Common Lilac......	1895	46	36	A compact and ornamental hedge.
45	Betula lenta................	Sweet Birch........				
46	Betula lutea............. ...	Yellow Birch.......				
47	Abies balsamea.....	Balsam Spruce....				
48	Viburnum lantana..........	Wayfaring tree				
49	Ptelea trifoliata......... ...	Hop tree	1899			These are not advanced enough to report upon ; No. 48 is dead.
50	Betula nigra..	Black Birch				
51	Hippophae rhamnoides......	Sea Buckthorn......				
52	Betula alba	White Birch........				
53	Betula pumila..............	Dwarf Birch........				

NATIVE SPRUCE.

About the middle of May a trip was made to the swamp at Sewell, Manitoba, in order to procure specimens of our Native White Spruce (*Picea alba*). About 150 trees were lifted which were planted in one of the shelter blocks in order to become established, and despite the very adverse season very few succumbed. As many complaints are received in reference to the non-success of planters of this valuable tree, it may perhaps be well here to give a short description of the method of lifting and planting followed out at this farm. In the first place only small isolated trees should be selected and as much of the natural soil taken with them as possible. These should be immediately transferred to the wagon box (preferably a tight one), and covered so as to preclude the possibility of the drying out of the roots. The latter precaution is probably the most important of all, and we are of opinion that to the neglect of this may be attributed the great proportion of failures. The sap of the spruce being very resinous, should it once become dry very little hope may be entertained of success, and it is advisable to throw a few pails of water over the load at every stopping place on the return journey. After planting, a thorough watering is given, which is followed by constant cultivation, and if these simple instructions are adhered to success would follow the efforts to grow this much to be desired tree.

ARBORETUM.

Planting in the arboretum was continued during the past season, both in the extension made on the east side last summer as well as on the hillside to the north. The latter portion is devoted principally to Maple, Poplar and other rapid growing trees, the hardiness of which has been fully demonstrated here, in order to clothe the bare hillside as quickly as possible. Following is a list of the new varieties added during 1900 :—

Additions to Arboretum during 1900.

Populus balsamifera intermedia.
Scotch Yellow Rose.
Populus nigra (Black poplar).
Juniperus sabina erecta (Erect savin).
Picea excelsa (Norway spruce).
Lonicera tatarica grandiflora (Tartarian honeysuckle).
Amber currant.
Rosa acicularis (Siberian prickly rose).
Carpinus caroliniana (Blue Beech).
Fraxinus nigra (Black ash).
Japanese Oak.
Rosa alpina (Alpine rose).
Rhus aromatica (Aromatic sumach).
Rosa spinosissima (Burnet-leaved rose).
Thuya occidentalis Elwangeriana (Elwanger's Arbor vitae).
Ribes aureum tenuiflorum.
Rhamnus davurica.
Rosa cinnamomea sibirica (Siberian cinnamon rose).
Thuya occidentalis variegata (Variegated Arbor vitae).
Rhamnus cathartica (Common buckthorn).
Spiræa sorbifolia (Sorbus-leaved spiræe).
Ribes alpinum sterile (Sterile alpine currant).
Betula alba fastigiata (White birch).
Gymnocladus canadensis (Kentucky coffee tree).
Photinia variabilis.
Cotoneaster acutifolia.
Berberis vulgaris foliis purpureis (Purple barberry).
Acer saccharinum No. 1, from Minnesota seed (Sugar maple).
Acer saccharinum No. 2, from Minnesota seed (Sugar maple).
Cytisus nigricans.
Celastrus articulatus (Japanese Bittersweet).
Rhus glabra (Glabrous sumach).
Salix candida femina (White willow).

THE VEGETABLE GARDEN.

The past season was without doubt one of the most discouraging experienced during the history of the farm, the Horticultural Department suffering equally with the other branches of the farm work.

Spring opened with bright sunny weather, seeding commenced early and everything seemed to be full of promise, and to point to a very successful year. The snowfall of the preceding winter being light, the soil did not contain its usual quantity of moisture and speedily dried out under the continuous bright weather, which was not perceptibly broken until June 26, when the first rain of the season fell.

Owing to the long drought the germination of seed was uneven, a large portion of it lying dormant in the soil until the end of June, while here and there in moist patches, germination had previously taken place, rendering a uniform test practically impossible; a sharp frost on the evening of June 8 when the thermometer registered 25°, still further complicating matters in this respect.

Although abundance of rain occurred during the balance of the season, a number of early sown varieties of vegetables, such as onions, carrots, parsnips, &c., failed to attain maturity, showing that an early growing season is absolutely necessary to mature such products in this province, no amount of fine weather afterwards, compensating for this deficiency.

On the evening of August 17, by which time the crops had considerably improved, a severe hail storm occurred (the first recorded on the Experimental Farm), which caused great havoc in the vegetable garden, cutting down much of the green stuff, and making serious indentations in pumpkins, squash, tomatoes, &c., and doing much injury generally.

HOTBEDS.

During the fall of 1899 a small greenhouse was erected which has proved very useful for plant-raising. An excavation was made and the sash used were those belonging to the hotbeds. The heating was accomplished by means of a brick flue running from end to end of the building and terminating in a chimney outside. At present it is only used from the end of March until fall, and for this period very little fuel is needed. Such a building would be of much value to market gardeners, enabling them to put such produce as lettuce, radishes, &c., on the market at a time when they command good prices, besides giving them greater control over young seedlings, than can be obtained by the sole use of hotbeds.

The plan adopted at the Brandon farm is to sow in boxes in the greenhouse during March and April and transplant into other boxes as soon as the plants can be handled, allowing them to stay in the greenhouse for a few days until established, when they are removed to cold frames outside and remain there until the time arrives for planting them in a permanent location. The advantage of the greenhouse is obvious—serving as a protection to tender seedlings during the most trying period, that is during germination, and a short time subsequent. It is then that the fungous disease, known as 'damping off,' is so prevalent and often causes much damage. At this time bad weather occasionally occurs, perhaps a fall of snow, making it impossible to even open a hotbed, and consequently such disease may pursue its ravages unchecked when only hotbeds are used. The greenhouse, with its ready means of egress and ingress, permits of proper attention being given to young plants at this critical period.

The cold frames are made in a similar manner to the hotbeds, with the exception that no care is taken to separate the straw from the manure, and only about half the depth of manure is used. They are made in sufficient time to allow the first sharp heat to escape by the time the plants are ready to be transferred to them. A few inches of soil is then put on the surface of the manure and the frame retains sufficient heat to keep out frost, without making any forced growth—and strong plants are the invariable result.

The first sowing was made on March 29, and concluded on April 20. The exceptionally dry and bright weather was specially favourable for this branch of the work, and a splendid lot of plants were ready for transplanting on May 30.

Owing to the unfavourable season, onions usually such an excellent crop, produced no bulbs whatever, while carrots, parsnips, beets and turnips germinated much too late to attain maturity, consequently the yield was small. Corn, cucumbers, squash, pumpkins, tomatoes and lettuce gave an average crop, and were looking as well as usual, until injured by hail in August from which they never recovered. Cabbage headed out well, but cauliflowers were late, very few heads being obtained before severe frost, while both peppers and egg plants ripened outside, a somewhat rare occurrence here.

ASPARAGUS, 1900.

Name of Variety.	When Planted.	Production Period.	Colour.	Flavour.	Vigour.
Conovers Colossal	1893	April 20 to June 30	Purple	Good	Fair.
Barr's Mammoth	1894	" 20 " " 30	"	"	Strong.
Columbia White	1894	" 20 " " 30	White	Tender	"

The above varieties have now been under test for a number of years, and have succeeded well. Every farmer should have a bed of this useful vegetable. It needs only once planting, and its earliness and delicacy makes it specially acceptable at a period when vegetables are scarce. Barr's Mammoth is the most prolific, though Columbia Mammoth White is considered by many to be of superior quality.

ARTICHOKES.

The Jerusalem artichoke (*Helianthus tuberosa*) has been tested at this farm for three years, and found to be wholly unsuitable for this country, not maturing before severe frost. This year a small quantity of the seed of the French artichoke was procured and sown in hotbed on April 5. The seed germinated well, plants were put into boxes on April 30, and planted in vegetable garden in June. The plants grew vigorously, and were in good condition before winter set in, and should they prove hardy, may be a valuable addition to the list of available vegetables here.

BEANS.

Twenty-six varieties of beans were sown in the open on May 21, in rows 30 inches apart, and were afterwards thinned to six inches apart in the row. Despite uneven germination, a sharp frost on the evening of June 8, and other climatic drawbacks of the season, a good average crop of pods was produced, though the delay in germination precluded the possibility of the seed ripening.

The germination of one variety (Taber's I. X. L.) was too poor to allow any comparison being made, and three others, Burpee's Bush Lima, Galega Refugee, and Broad Windsor, did not arrive at a fit condition for table use.

Beans—1900.

Number.	Variety.	Date Ready for use.	Colour.	Shape.	Ratio of Productiveness.	Length of Pod.	No. of Beans in Pod.	Texture.
						In.	Beans.	
1	Roger's Lima wax	Aug. 13	Yellow	Flat straight	120	3½	4	Tender.
2	Canadian wonder	" 9	"	Long flat	80	7	5	Very tender.
3	Flageolet Scarlet wax	" 13	"	Flat straight	70	6½	5	"
4	New Everbearing	" 6	Green	"	68	5	4	Fairly tender.
5	Marvel of Paris	" 14	"	Long round	66	6	5	"
6	Yosemite Mammoth wax	" 12	Yellow	Long flat	64	6	5	Very tender.
7	Keeney's Rustless wax	" 12	"	Round straight	60	5	4	Tender.
8	Black Seeded wax	" 6	"	Round curved	56	4½	5	Very tender.
9	Golden wax	" 6	"	Curved round	53	3⅓	4	Tender.
10	Black-eyed wax	" 13	"	Straight flat	52	4⅓	5	Very tender.
11	Detroit wax	" 13	"	"	50	3½	4	Fairly tender.
12	Triumph of France	" 11	Green	Flat straight	50	5	6	Tender.
13	Early Dun Colored	" 6	"	Straight round	50	5	5	Fairly tender.
14	Early Mohawk	" 6	"	Straight flat	50	6½	4	Very tender.
15	White wax	" 11	"	"	48	5	6	"
16	Yosemite wax	" 11	Yellow	Curved round	45	6	4	Fairly tender.
17	Wardwell's Kidney wax	" 9	"	Flat straight	40	5½	5	Tender.
18	Giant Dwarf wax	" 10	Green	"	40	7	5	Very tender.
19	Dwarf Chocolate	" 10	"	"	40	6	5	Tender.
20	Dwarf Lyonais	" 15	"	Long straight	38	6	4	Fairly tender.
21	Ne Plus Ultra	" 6	"	Straight round	35	5½	6	"
22	Best of All	" 14	"	Straight flat	33	6	5	Tender.

The four following varieties proved the best, taking into consideration productiveness, texture and appearance for market.

Rogers Lima Wax.—Very similar in shape to the Lima beans, a beautiful light yellow colour, very dwarf and enormously productive.

Canadian Wonder.—This bean continues to merit its reputation as one of the best varieties for Manitoba. It is a deep yellow in colour, fairly early, very productive, with large handsome pods.

Scarlet Flageolet Wax.—This variety is an old favourite, and deservedly so. The pods are large, of a deep yellow colour and borne in profusion.

New Everlasting.—The most productive of the green varieties tested this season, the pods are short, flat, and are produced in abundance, continuing until frost.

BEETS.

Only two varieties of beets were tested this season, viz., Early Eclipse and Early Blood Turnip, both of which are turnip rooted varieties.

Variety.	Date Sown.	Date Pulled.	Colour.	Shape.	Yield.	
					Bush.	Lbs.
Early Blood	May 3	Oct. 10	Dark	Turnip	216	14
" Eclipse	" 3	" 10		"	198	17

Both were sown with a Planet Junior Hand drill in rows 30 inches apart, the unusually low yield may be attributed to the very late germination of the bulk of the crop. The table qualities of both were excellent.

BROCOLI.

The seed was sown in hot-bed on April 20, and planted outside on June 15. The heads, however, did not begin to form until late in the season, and were nipped by frost before attaining maturity.

CARROTS.

Two varieties of carrots were sown on May 3, viz., Danver's Half Long, and Half Long Chantenay. Late and uneven germination proved detrimental to this crop, and only a comparatively light yield was obtained.

Variety.	Date Pulled.	Type.	Texture.	Yield per Acre.	
				Bush.	Lbs.
Danver's Half Long	Oct. 5	½ Long	Tender	120	16
Half Long Chantenay	" 5	½ "	"	114	45

CABBAGE.

The cabbage crop was one of the least affected by the drawbacks of the season, and towards the close of the season some very good heads were obtained. The seed of four varieties was sown in hot-bed on April 20, and transplanted to the open on June 15. On account of the general scarcity of green stuff, gophers destroyed this planting, and a second planting was necessary. This was made on June 25, and on October 5, the crop was stored in root cellar.

Variety.	Date Pulled.	Shape.	Average Weight.	Percentage Headed Out.
Early Jersey Wakefield	Oct 3	Pointed	8 pounds	76
The Lupton	" 3	Flat	10 "	86
Late Flat Dutch	" 3	"	10 "	88
Red Drumhead	" 3	Rounded	6 "	50

The variety Late Flat Dutch does not compare favourably with Marblehead Mammoth as a standard late variety.

CAULIFLOWER.

Two varieties were sown on April 20, in hotbeds, viz., Early Snowball and Large Early Erfurt, and only very few heads were obtained from the former before frost, while the latter failed to bring any to a condition fit for table.

CELERY.

Four varieties of celery were sown in boxes in hotbed on March 29, viz., White Plume, Pink Plume, Giant Pascal and London Prize Red. The germination was good in all cases but one, viz., London Prize Red, which was evidently very poor seed. Exceptionally fine plants resulted, but on account of the very dry weather at planting time, and our very inadequate water supply, it was deemed unadvisable to put out the plants.

CHICORY.

One variety (Large Rooted Magdeburg) was sown on May 3, and produced magnificent roots. This is the second test of this vegetable here, and on both occasions the yield and quality have been exceptional.

CORN.

This vegetable produced a good crop, despite the drawbacks of the year. Four varieties, viz., Early Cory, First-of-all, Mitchell's Extra Early and Squaw Improved, were sown with the Planet Junior Hill drill, in rows 4 feet apart and 2 feet apart in the row, on May 21. Though a portion of the seed came up immediately, germination was not complete until after the June rains, but even the later part of the crop came to a condition fit for table use, and in some cases ripened. The bulk of Mitchell's Extra Early and Squaw, and about 20 per cent of Cory and First-of-all produced ripe seed.

Variety.	Sown.	Ready for Use.	Type.	Length of Head.	Weight Per Dozen.	Flavour.
				In.	Lbs.	
Early Cory	May 21	Aug. 15	8 row, swe't	6	4	Good.
First of All	" 21	" 15	10 "	$6\frac{1}{2}$	$3\frac{1}{2}$	"
Mitchell's Extra Early	" 21	" 10	8 " flint.	6	$3\frac{1}{4}$	Fair.
Squaw Corn	" 31	" 10	8 " "	7	4	"

CUCUMBERS.

The cucumber crop was, on the whole, a very fair one, and had it not been for the hail storm in August would have been fully up to the usual standard. Fortunately, however, a fair quantity of fruit had been gathered previous to this. The forcing variety (Carter's Model) grown in the greenhouse produced some very fine early fruit.

Variety.	Where Sown	Date Sown.	Date Ready.	Shape.	Average Length.	Average Weight.	Productiveness.
					In.	Ozs.	
White Spine	Outside.	May 21	Aug. 26	Symmetrical, spiny.	8	10	Fair.
White Wonder.	"	" 21	" 26	" "	8	10	Very good.
Paris Pickling	"	" 21	" 12	Spiny, twisted	10	11	"
Giant Pera	"	" 21	" 20	Smooth, straight	12	12	Fair.
Carter's Model	Greenhouse.	Apr. 2	July 20	" long	18	16	Very good.

All the ridge varieties were sown in hills, three feet apart, the rows being four feet apart.

EGG PLANT.

One variety of this vegetable (Early Long Purple) was sown in hotbed on April 3, and transplanted to the open ground on June 15. The plants grew dwarf and stocky and produced fruit, which was ready for the table on August 5, of excellent flavour.

LETTUCE.

Two varieties of lettuce were sown outside on April 6, but on account of late germination did not arrive at a condition fit for table use until the latter part of July. In the greenhouse, lettuce sown on March 29 was ready for use in May—the product being very tender and palatable. Toronto Gem was the variety used. Hanson and Paris Cos were sown outside.

LEEKS.

The variety know as London Flag was tested, but the yield was small.

ONIONS (SEED.)

The seed onion crop was a failure this season, none of the varieties tested producing bulbs. Late germination was responsible for this, as, to succeed with onions, early sowing and early germination are indispensable.

ONIONS (SETS).

The onion sets produced an average crop despite the drawbacks of the season. Two varieties were planted on May 3, viz., Shallots and Yellow Dutch Sets.

Variety.	Date Ripened.	Colour.	Shape.	Yield per Acre.	
				Bush.	Lbs.
Dutch Sets	Oct. 5	Yellow	Globular	463	16
Shallots	Sept. 20	Brown	Clusters	140	19

PARSNIPS.

One variety of the above (Hollow Crown) was sown on April 16, but owing to late germination the yield was small.

PARSLEY.

As usual this vegetable was entirely satisfactory. The variety grown was Extra Curled, the seed was sown in the open on May 3.

PUMPKINS.

Two varieties of pumpkins were grown during the past season, viz., Connecticut Field and Sweet or Sugar.

Both were sown in the open on May 21, and produced a good crop of ripe fruit.

Variety.	Date Ripe.	Colour of Flesh.	Average Weight.	Flavour.	Productiveness.
			Lbs.		
Sweet or Sugar	Aug. 15	Yellow	7	Very good	Very pr'd.
Connecticut Field	" 10	"	20	Fair	"

The variety, Sweet or Sugar, was by far the best for pie purposes--Connecticut Field being evidently a stock-feeding variety.

POTATOES (TEST OF VARIOUS CUTTINGS).

The test as to the value of different cuts for seed purposes of the potato was continued this season with the following results—the variety chosen for the test was Crown Jewel :—

Size of Cut.	Percentage of Germination.	Quality of Product.	Weight Planted.	Weight of Large.	Weight of Small.	Total Weight.
			Ozs.	Lbs.	Lbs.	Lbs.
Seed Ends	95	Fairly regular	¾	5	½	5½
One Eye	65	Very irregular	1¾	3¼	½	3¾
Two Eyes	80	" regular	3¾	7½	....	7½
Three Eyes	90	" "	6	5½	½	6
Four Eyes	100	Fairly regular	8	6¼	1¼	7½
Whole potatoes	100	Very irregular	12	6¾	4¼	11

Considering the dry condition of the soil at planting time, the germination of potatoes was very good. In the above test the Two-eyes gave the best average return, the yield being high and the product remarkably regular. Seeds ends again were very satisfactory, while the whole set, though giving the largest returns, were very irregular.

PEPPER.

One variety of pepper, 'Black Nubian,' was sown in hotbed on April 3 and transplanted to the open June 15. A fair crop was gathered on August 10, the colour of the fruit being a dark purple and very attractive.

RHUBARB.

There are now represented nineteen varieties under test, which were, last year, divided on account of overcrowding in the old bed, and a fresh plantation was made. More space has been given the plants in the new bed, which will permit visitors to examine the characteristics of the different varieties more conveniently than before.

Variety.	*Growth.*
Victoria	Vigorous.
Tottle's Improved	Very strong.
Strawberry	Vigorous.
Royal Albert	Very vigorous.
Giant	Fairly vigorous.
Marshall's Linnæus	Vigorous.
General Taylor	Rather weak.
Scarlet Nonpareil	Very vigorous.
Early Crimson	"
Brabant's Colossal	"

Variety.	*Growth.*
Magnum Bonum	Very vigorous.
Prince Albert	"
Paragon	Weak.
Toblesk	Vigorous.
Samyster's Prince	"
Early Prince	"
Early Scarlet	"
Excelsior	Planted fall, 1900.
Queen	" "

SQUASH.

Only two varieties of squash were sown the past season, viz., Long White Bush Marrow and English Vegetable Marrow. Both did extremely well and a very good crop was obtained, although the fruit was somewhat damaged by hail on August 17.

Variety.	Date Sown.	Date Ready.	Average Weight.	Color.	Shape.	Productiveness.
Long White Bush Marrow....	May 21.	Aug. 10.	12 lbs.	Creamy White	Long...	Very productive.
English Vegetable " ...	" 21.	" 12.	8 "	"	" ...	"

SWEET HERBS.

Sage, Summer Savory and Thyme were grown this season with the usual success, and the product was dried and stored for winter use.

EXPERIMENTS WITH FIELD BEANS.

Four varieties of these were sown in rows two feet apart, in plots of one-twentieth acre. The soil was a clay loam, which had been summer-fallowed. All were sown on May 28, but did not germinate until July and only an occasional bean ripened, and for that reason no returns of yields are available.

THE FLOWER GARDEN.

The flower garden was very successful during the past season. Though the prospect was not promising at planting time on account of the drought, the water supply was sufficient to carry the beds through the critical period ; and the generous rains during the remainder of the season caused a luxuriant growth, and a profusion of flowers, which were much admired by visitors. In annuals, Phlox, Verbenas, Antirrhinum, Stocks and Salpiglossis, were especially noted for their brilliancy of colouring, while the Petunias, particularly the single varieties, were the finest we have ever grown at the farm, some of the flowers attaining a diameter of nearly six inches, with beautifully fringed edges and varied colours.

A very satisfactory little plant is *Brachycome iberidifolia* (Swan River Daisy). It is very suitable for edging, being dwarf ; it blooms very freely and is easy of cultivation. The Asters were this season almost entirely free from disease, and all types of this beautiful annual flowered well Following will be found a list of annuals grown, together with date of sowing and flowering period :—

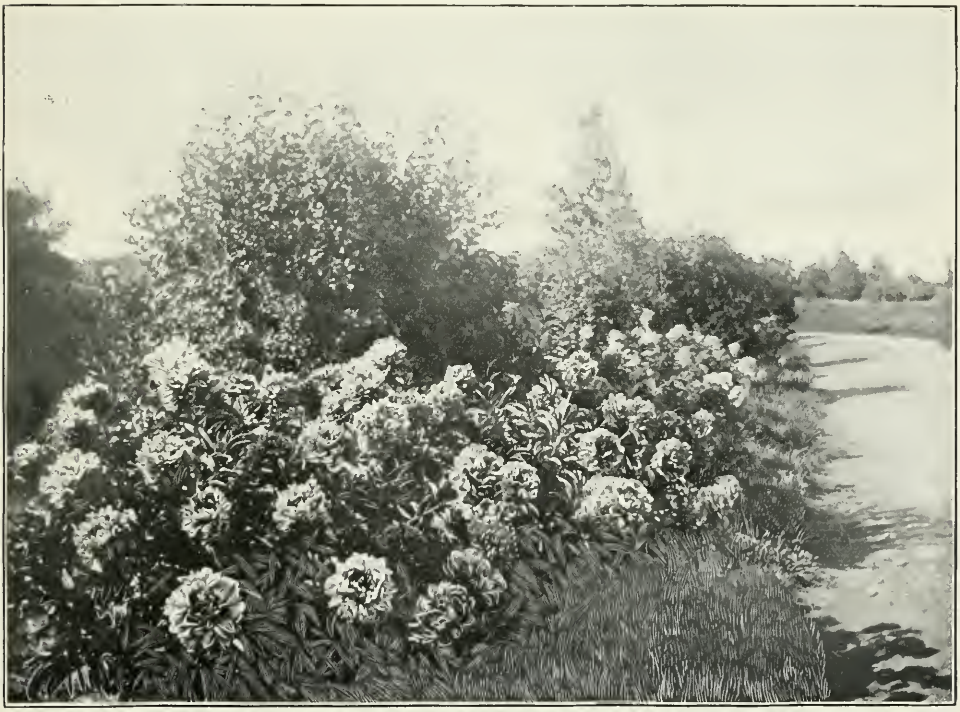
Variety.	Date and Manner of Sowing.	Flowering Period.
Aster—		
Pæony Flowered Globe	Hotbeds, April 2	July 25 to frost.
Pyramidal Flowered German	" 2	" 25 "
Globe Flowered German	" 2	" 25 "
Quilled German	" 2	" 25 "
Betteridge's Prize	" 2	" 25 "
Imbricated Pompon	" 2	" 25 "
Truffaut's Pæony Flowered Perfection	" 2	" 25 "
Antirrhinum Majus	" 2	" 8 "
Majus Nanum	" 2	" 8 "
Brachycome Iberidifolia	" 2	June 10 "
Centaurea Imperialis	" 2	" 25 "
Chysanthemum—		
Coronarium Albo, fl. pl	" 2	July 1 "
Fairy Queen	" 2	" 1 "
Carinatum Hybridum Fimbriatum. fl. pl	" 2	" 1 "
Atrococcineum	" 2	" 1 "
Gaillardia Picta	" 2	" 5 "
Picta Lorenziana	" 2	" 5 "
Helichrysum Monstrosum	" 2	" 10 "
Lobelia, Crystal Palace Compacta	" Mars 29	June 25 "
Petunias—		
Hybrida Grandiflora Fimbriata	" April 2	July 12 "
" Nana Compacta	" 2	" 12 "
" " fl. pl	" 2	" 12 "
" Grandiflora Superbissima	" 2	" 12 "
Pansies (five types)	" 2	June 20 to snow.
Phlox—		
Drummondi Grandiflora	" 2	" 20 to frost.
" " Nana Compacta	" 2	" 20 "
Rhodanthe Astrosanguineum	" 2	Did not transplant well.
Salpiglossis—		
Variabilis Nana	" 2	June 20 to frost.
" Grandiflora	" 2	" 20 "
" Superbissima	" 2	" 20 "
Stocks—		
Dwarf German	" 5	July 1 "
Large Flowered Ten Weeks	" 5	" 1 "
" " Pyramidal	" 5	" 1 "
Dwarf Bouquet	" 5	" 1 "
Tagetes Patula Nana	" 5	June 10 "
Verbena Hybrida	" 2	July 1 "
Hybrida Auriculæ Flora	" 2	" 1 "
Zinnia Elegans	" 5	" 1 "
Elegans Pumila	" 5	" 1 "
Calliopsis (Mixed varieties)	Outside, May 10	June 20 "
Mignonette "	" " 1	" 20 "
Portulaca "	" " 20	July 30 "
Sweet Pease "	" April 20	" 1 "

The work of transplanting commenced on April 11, and was completed on April 30. Some seed of Zinnias and Verbenas saved from plants grown on the farm the previous year, was sown for comparison with imported seed. The germination in both cases was in favour of the home-grown seed, while the resulting flowers showed no deterioration from their originals.

HERBACEOUS PERENNIALS.

This useful class of plants continues to attract the attention of visitors, and numerous applications for plants and seeds are received at the farm, showing that the farmers of Manitoba are fast recognizing the value of these permanent flowers as a means of home adornment easily within their reach. In last year's report, a list of some of the best varieties which have been fully tested here was given, to which the following may be added :—

Brandon, Man. Tree planting and flower bed near Superintendent's house.



Pæonias in bloom near house of Superintendent of Experimental Farm, Brandon, Man.

Lilium tigrinum.—The well-known tiger lily. This plant stands the winter well without any protection, and made a fine show of flowers during August.

Polemonium reptans (Jacob's Ladder).—A very vigorous, free blooming perennial. It is very hardy, and both foliage and flowers are handsome. They can be procured in two colours, blue and white. May be grown easily from seed.

Baptisia australis (False Indigo).—A pretty pea-shaped flower, and well worthy of a place in the perennial border. Propagated from seed.

Gypsophila paniculata (Angel's Breath).—The flowers of this plant are very useful for boquets, the gracefulness and delicacy of its sprays of minute white flowers rendering it a good variety for this purpose. Easily propagated from seed.

Rudbeckia Laciniata (Golden Glow).—A splendid plant for the background of borders. It grows to a height of five feet, and is literally covered with double yellow blossoms on long stems, which make them valuable for cutting. Propagated by division of the root.

Hesperis matronalis (Sweet Rocket).—An old favourite. Flowers very early, and profusely, and can be easily grown from seed.

Veronica salurgoides.—Though not a showy plant, this pretty veronica is worthy of a place in the garden. Propagated from seed.

Dahlias.—The following dahlias were received from the Central Experimental Farm on May 21, 1900, and were planted in flower garden a few days afterwards :—

Constance.	Nemesis.
Marguerite.	Bishop of Durham.
Wm. Plant.	Snowclad.
Fairy Queen.	Liliputian.
Wm. Agnew.	Mrs. Langtry.
Clifford W. Bruton.	John Sladden.
Mantas la villa.	Perfect Vallon.
Cactus Queen.	Victory.
Hector.	Susan Ingham.
Lyndhurst.	Herbert Turner.
Woman in White.	Crimson Beauty.
Wm. Dodds.	Cochineal.
Little Pigmy.	Chairman.
Hubert.	Gem.
Bird of Passage.	Lady Antrobus.

Of the above, four failed to make any growth, viz., Wm. Plant, Fairy Queen, Wm. Dodds and Susan Ingham. The remainder grew vigorously, and all produced flowers, some of which were very fine. They were lifted on October 15, and stored in the superintendent's house cellar.

Propagation of Dahlias.—Some twenty varieties of Dahlias which have been grown on the farm in previous years, were taken from the cellar last April, and placed underneath the stage in the green-house. Growth was soon commenced, and as soon as the shoots were long enough, cuttings were made of them and planted in boxes of sand, 95 per cent of which struck. On June 1, the rooted cuttings were planted outside, made strong plants, and flowered before frost. On lifting some fair-sized tubers were disclosed.

Roses.—The four roses mentioned in previous reports, viz., Baron Prevost, Madame Plantier, Gem of the Prairies, and Stevenson's rose (unidentified), are still alive. Last winter they were cut back more severely than usual, and Stevenson's rose was the only variety which produced flowers. Of the thirteen varieties mentioned in page 330 of last year's report (portion of a consignment received on May 2, 1899) as being alive in the fall of 1899, only one, viz., Docteur Arnal, survived the winter. This made some fine growth during the past season, but did not flower.

Gladioli.—A number of Gladioli bulbs were received from the Central Experimental Farm in May, part of which were started in hotbeds, the balance being planted in the open. Those started in hotbed were transferred to the open June 1, and at that time were well advanced. The frost on the evening of the 7th, however, gave them a check from which they did not fully recover, and only a few of them flowered. The bulbs which were planted in the open made fine growth, and about 50 per cent of them produced fine spikes. All were lifted on October 15, and stored in a cellar.

Delphinium condoretum Lemoinei.—A package of seed of this new Hybrid Perennial Larkspur was received from Central Experimental Farm on April 16 and sown in hotbeds on that date. The germination was good, and some nice sturdy plants were transferred to the open on June 20. Many of these flowered and showed two or three distinct shades of blue. The habit of growth and foliage is similar to that of *Delphinium Cashmerianum*, but the foliage is more glossy.

Tulips.—A consignment of tulip bulbs, received from the Central Experimental Farm in the fall of 1899, was planted in the flower garden, in beds occupied during the summer by annuals. Nearly all started, and made a fine display of colour during the spring months, which was greatly appreciated at a time when flowers are extremely scarce. As soon as the tulips were over, annuals were planted between the rows, care being taken to avoid injuring the bulbs, and thus an almost constant succession of flowers was kept up during the entire season.

Narcissus poeticus (*Poet's Narcissus*).—A bed of this beautiful Narcissus was planted in the fall of 1899. A very heavy covering of manure was placed on the surface of the bed, which was removed as early as practicable in the spring. The result appeared to indicate that the covering had been overdone—for the only bulbs that survived were those around the edge of the bed, where the covering of manure was not very deep. These flowered freely, and it seems possible that when the right amount of covering has been determined, we may be able to grow this very desirable spring flower with success.

ADDITIONS TO HERBACEOUS PERENNIALS, 1900.

One hundred and eighty-four varieties of perennial flowers were received from the Central Experimental Farm the past spring, and were planted in beds where they would have some shelter until established. Many of them flowered during the summer and it is hoped that many varieties in this large and interesting collection will prove hardy here.

DISTRIBUTION OF SEED GRAIN, POTATOES, &c.

Owing to the supply being somewhat limited, a less quantity than usual of grain was sent out, but a larger quantity than usual of maple and rhubarb seed has been distributed.

The following quantities were sent out to applicants :—

Wheat, 2 bushels or more	21
Oats " "	40
Barley " "	11
Grain of all kinds in 3-pound bags	459
Seeding trees, packages	310
Shrubs, packages	215

Distribution of potatoes, &c. :—

Potatoes in 3-pound bags	97
Maple seed, in 1-pound bags	240
Rhubarb seed, packages	129
Flower seed, packages	152

BOX ELDER OR MANITOBA MAPLE SEEDS.

The following reports have been received from parties to whom Manitoba Maple Seeds were sent in 1-pound packages, during the spring of 1899 :—

No. of applicants supplied	169
No. of reports received	65

	Successes.	Failures.
Seeds sown on summerfallow	10	3
" spring ploughing	17	2
" fall ploughing	15	3
" breaking	11	2
" garden (digged with spade)	2	..
Largest number of plants raised from 1-pound packet		4,000
Maximum height of seedlings at end of season		2½ feet.

REPORTS ON DISTRIBUTION OF COLLECTIONS OF TREES, SPRING 1899.

Only ten per cent of the parties supplied with trees reported on them. These all report having received the packages in good condition.

The small proportion of Cottonwoods to strike is noticeable; they do not appear to stand mailing as well as either Russian Poplars or Willows.

No. of applicants supplied	331
No. of reports received	30

All of which report that the cuttings were received in good condition.

Average per cent of cuttings struck—

	Per cent.
Russian Poplars	50
Cottonwoods	10
Willows	70

Maximum growth, summer 1899—

	Feet.
Russian Poplar	4
Cottonwood	3½
Willows	3

FRUIT TREE REPORTS.

During the spring of 1899 seedlings of Siberian Crab, Native Plum and Sand Cherries were distributed from this farm :—

No. of applicants supplied	65
No. of reports received	55

Condition in which the trees were received—

Good	51
Fair	4
Bad	0

Average per cent of trees living, summer 1899—

	Per cent.
Crab apples	60
Plums	90
Sand cherries	90

Maximum growth, summer 1899—

	Feet.
Crab apples	2
Plums	4
Cherries	4

SAMPLES OF GRAIN FOR EXHIBITION PURPOSES.

Twenty-two boxes of samples were forwarded from this farm to the Paris Exposition last year, containing good samples of as large a supply of agricultural products as could be furnished. A similar exhibit but on a smaller scale has been prepared during the past season for the exhibition to be held at Glasgow next year. A large display was made at the Brandon Fair in August of this year ; two boxes of threshed grain and sheaves have also been shipped to Canadian immigration agents in Scotland.

GRASSHOPPERS.

These injurious insects made their appearance in several places south-east of Brandon during the past season, and at the request of the resident farmers, I visited some of the affected sections for the purpose of ascertaining the extent of their ravages. Fortunately the districts affected were limited in their area, as compared with the province, otherwise the injury would have been very serious.

ROADS.

During the year fifty-two rods of new road has been constructed, leading from the farm buildings to the uplands. In addition to this all the roads on the farm have received a fresh coat of gravel, bringing them into first class condition.

PASTURE FIELD.

The sixty-five acre pasture field fenced in during 1899 has proven very useful. Fortunately three excellent live springs have been found within its boundary and they have proved particularly serviceable during the severe drought of early summer. Fifteen acres of this pasture field which had been under cultivation for a number of years was seeded to Brome grass in April of this year, this furnished fresh pasture in the fall when the native grasses were dried up.

NEW BREAKING.

During the season 22 acres of new land has been broken and backset. A portion of this is in a pasture field and will be reseeded in the spring with Brome grass.

FARMERS' MEETINGS.

Owing to illness last winter I as unable to attend as many meetings as usual. On February 1, I had the pleasure of attending, in company with Mr. F. T. Shutt, a large and interesting meeting at Portage la Prairie.

Meetings were also attended at the following places :—

Portage la Prairie, June 27, 1900.
Oak Lake, November 12, 1900.
Minnedosa, November 16, 1900.
Belmont, November 19, 1900.
Glenboro', November 21, 1900.
Hartney, November 23, 1900.
Virden, November 13, 1900.
Gladstone, November 16, 1900.
Wawanesa, November 20, 1900.
Melita, November 22, 1900.
Rapid City, August 11, 1900.

METEOROLOGICAL RECORD.

Month.	Highest Temperature.		Lowest Temperature.		Total Rain-fall.	Total Snow-fall.	Total Amount of Sunshine.
1899.	On	°	On	°	In.	In.	Hours.
December	6	39·9	30	—24·5	....	3	$108\frac{1}{10}$
1900.							
January	6	43·6	31	—32·6	....	$4\frac{3}{4}$	$99\frac{7}{10}$
February	22	34·6	9	—40·6	....	$5\frac{3}{4}$	$140\frac{4}{10}$
March	31	47·3	4	—23·3	....	3	$148\frac{6}{10}$
April	23	79·6	15	14·7	$\frac{33}{100}$	....	$264\frac{5}{10}$
May	12	99·3	2	17·6	$\frac{14}{100}$	....	$261\frac{3}{10}$
June	23	106·3	8	25·6	$1\frac{19}{100}$	....	$296\frac{1}{10}$
July	26	86·3	19	36·0	5	....	$284\frac{7}{10}$
August	2	93·2	28	32·6	$5\frac{89}{100}$	....	$197\frac{2}{10}$
September	20	79·4	17	26·4	5	....	$160\frac{3}{10}$
October	19	72·6	16	22·4	$\frac{32}{100}$	....	$127\frac{5}{10}$
November	4	48·3	24	25·0	....	....	$76\frac{7}{10}$
					$17\frac{87}{100}$	$16\frac{1}{2}$	$2,165\frac{1}{10}$

CORRESPONDENCE.

This year 4,252 letters were received and 3,076 despatched, irrespective of 2,927 circulars sent out.

I have the honour to be, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.,
November 30, 1900.

To Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the thirteenth annual report of the operations on the Experimental Farm for the North-west Territories, at Indian Head, Assiniboia, during the year 1900.

The past season has been one of the most exceptional on record and, also, one of the most unsatisfactory to the settlers depending on grain. The winter of 1899 and 1900 was everything that could be desired, and from the time spring opened till seeding was completed the weather could not have been finer. On May 8, however, dry, windy weather set in and continued till July 4. During this time winds were almost continuous and the heat was excessive. On June 21, 22 and 23 the thermometer registered 101·5, 106 and 103 degrees Fahr., respectively, and in Assiniboia immense injury was sustained by the crops already weakened by protracted drought. During June a few local showers fell, but on account of the heated condition of the ground and atmosphere, were of little value, except in some instances where they kept the crops from drying up entirely. On July 4, 5 and 6 heavy rains set in and somewhat revived the grain-growing on fallow-land, but the crops on stubble were past saving.

In Saskatchewan and Alberta, June rains were abundant and crops of all kinds made excellent progress, giving promise of an exceptionally large yield. In the majority of cases this promise was fulfilled, but on account of heavy rain and snow-storms during harvest, the securing of the crop was an expensive and laborious task.

In Assiniboia, the harvest commenced during the first week of August, the earliest on record, but it was accompanied by heavy rains which caused delay in cutting and in consequence many fields were over-ripe before they could be reached by the binder. The rains continued during August and the early part of September and many cases of grain-growing in the stooks were reported.

Stock, in every part of the Territories, has never done better than during the past season, and although the prices for export beef have fallen considerably, ranchers and farmers are well satisfied with the year's work. This industry is growing very rapidly in Alberta and Saskatchewan and a few parts of Assiniboia. During the summer a representative meeting of stockmen was held at Calgary, Alberta and the 'North-west Cattle-breeders Association' and the 'North-west Horse-breeders Association' were organized.

EXPERIMENTAL FARM CROPS.

On the experimental farm the crops suffered very severely from winds and dry weather, and I regret having a very unsatisfactory report to offer of the result of the season's operations.

Nearly two-thirds of all our oats and pease and all the barley plots were killed by winds and had to to be resown, in consequence of which, many of the plots had not matured when frost came and were only fit for fodder. The crop, however, was a heavy one and having a considerable quantity of partially matured grain in it, the loss is not serious, except from an experimental point of view, as the returns cannot be given.

The hay crop (Brome, Native and Western Rye-grass) was a complete failure.

Potatoes and corn were the best ever grown on the farm ; turnips and mangels were a fair crop and carrots a complete failure.

Trees and shrubs made little progress until the rains came in July, when they made a fresh start, but the season was too short and only about one-half the usual growth was made.

Small fruits promised an abundant crop until June 21, when the excessive heat of that and the two succeeding days cooked almost the entire crop.

The Siberian Crab (*Pyrus baccata*), as well as the Seedling Native and improved varieties of plums produced a very satisfactory crop of fruit.

EXPERIMENTS WITH SPRING WHEAT.

Forty-nine varieties were tested on one-twentieth acre plots ; seven of the same varieties on plots ranging from one-half to ten acres, and Red Fife was used in test of fertilizers, rotation test, and test of blue-stone, as a preventive of smut.

The test of early, medium, and late seeding, sowing seed at different depths, sowing different quantities of seed per acre, and of hoe versus press-drill, were discontinued, as it was considered that during the previous eight years, sufficient reliable data had been secured to settle the points under observation without further trials.

TEST OF VARIETIES IN UNIFORM PLOTS.

Forty-nine varieties were sown on April 30, by hoe-drill, at the rate of 1½ bushels per acre, on one-twentieth acre plots of clay-loam, summer-fallowed in 1899.

All the varieties germinated well, and were from 2 to 4 inches high when winds and hot, dry weather set in and damaged many of the sorts to such an extent that it was deemed advisable to re-seed the injured plots with barley, which was done on June 13. Those left were very thin, and owing to the rains in August, causing a late, rank growth, the greater number of the plots were caught by frost on September 13.

The varieties were all sown in one row of plots across a 20-acre field, and those that withstood the winds and dry weather were well scattered over the whole row, clearly demonstrating that some varieties are much more susceptible to winds and drought than others sown and growing under similar conditions. The results given cannot, however, be regarded as of any value in indicating the relative productiveness of the different sorts under trial.

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per acre.		Weight per Bushel.	Remarks.
				In.		In.		Lbs.	Bus.	Lbs.	Lbs	
1	Red Fife	Sept. 4	144	31	Strong	3	Bald	2,200	30	20	62	Good sample.
2	Stanley	" 4	144	34	"	3½	"	2,000	28	40	61	"
3	Dion's	" 1	141	41	"	4¼	Bearded	2,360	25	40	57½	"
4	Beaudry	" 12	152	41	"	3½	"	2,240	25	..	60	Frozen.
5	Huron	" 8	148	39	"	3½	"	1,500	20	40	60	Good sample.
6	Pringle's Champl'in	" 17	157	36	"	4	"	3,360	20	40	....	Frozen.
7	Dufferin	" 3	143	42	"	4	"	2,400	20	..	60	Good sample.
8	Goose	" 4	144	38	"	3	"	2,800	20	..	61	"
9	Hungarian	" 4	144	30	Medium	3	"	1,860	19	..	60½	"
10	Alpha	" 17	157	54	Strong	4½	"	2,000	19	..	....	Badly frozen.
11	Colorado	" 12	152	41	Medium.	4½	"	2,000	18	20	56	"
12	Blenheim	" 12	152	47	Strong	5	"	2,700	18	20	51½	"
13	Percy	" 12	152	37	"	4	Bald	2,360	18	..	52½	Frozen.
14	Captor	" 13	153	35	"	3	"	1,760	17	40	55½	Good sample.
15	Wellman's Fife	" 3	143	34	"	4	"	2,800	17	..	62	"
16	Beauty	" 12	152	38	"	3½	"	2,200	16	40	56	"
17	Progress	" 12	152	37	"	3	"	2,420	16	20	....	Badly frozen.
18	Crown	" 17	157	32	"	3½	"	2,460	15	40	49	"
19	Monarch	" 17	157	36	Weak	4½	"	3,080	15	20	....	"
20	Preston	" 12	152	37	Strong	4	Bearded	2,280	15	20	54½	"
21	Vernon	" 12	152	39	"	3	"	2,560	14	..	47½	Good sample.
22	White Russian	" 4	144	31	"	3¼	Bald	2,400	14	..	62½	"
23	Rideau	" 17	157	26	Weak	3	"	2,540	13	40	....	Badly frozen.
24	Rio Grande	" 17	157	39	Strong	4	Bearded	2,400	13	20	....	"
25	Countess	" 12	152	36	"	3	Bald	2,540	12	40	54	"
26	Ladoga	" 12	152	40	Medium	4	Bearded	2,340	12	40	....	"
27	Roumanian	" 17	157	39	Strong	4	"	3,100	11	40	....	"
28	Red Fern	" 17	157	44	Medium	4½	"	2,920	11	20	....	"
29	Dawn	" 17	157	33	Weak	3½	Bald	2,540	11	..	....	"

Twenty other varieties included in this test were a complete failure owing to winds, dry weather and frost.

TEST OF VARIETIES IN FIELDS OF ½ TO 10 ACRES.

As a considerable area of Brome and Native sod, broken and back-set, in 1899, was available for this year's crop, the greater part of the larger lots of spring wheat were sown on this land.

The sod, in all cases, had been broken 2 inches deep in May and June, and back-set 5 inches deep before harvest. After harvest the surface was made as fine as possible by repeated strokes of the disc-harrow.

As a comparative test, Red Fife wheat was sown on both Brome and Native sod. The grain on Brome sod appeared to stand the drought much better than that on Native sod, and produced a considerably larger crop of wheat. The soil in all cases was a clay loam.

WHEAT--FIELD AND ACRE LOTS.

Name of Variety.	Size of plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
					In.		In.		Lbs.	Bush.	Lbs.	Lb
Wellman's Fife root land)..	2½ ac.	April 11	Aug. 8	119	34	Strong..	3¾	Bald...	2,610	17	40..	62¼
Red Fife (on brome sod)....	1½ "	" 6	" 9	125	34	" ..	3	" ...	2,700	17	20..	62
Preston (on sod) rye grass..	5 "	" 10	" 4	116	35	" ..	3½	Bearded	2,660	16	10..	63¼
Stanley (on root land)......	4½ "	" 10	" 2	114	36	" ..	3¾	Bald...	3,000	15	....	63¾
Hungarian (on sod) rye grass	½ "	" 10	" 8	120	33	Weak ..	3½	Bearded	2,740	12	40..	63½
Red Fern (on sod) "	1½ "	. 10	" 8	120	34	Medium	4	"	2,690	12	30..	64¾
Red Fife (on sod) native....	10 "	" 9	" 6	119	37	Strong..	3½	Bald...	2,880	11	....	62¼
Percy (on sod) native	4 "	" 11	" 8	119	27	" ..	3	" ...	2,000	6	50..	60½

The Red Fife and Percy on sod of native grass were both damaged by gophers.

The root land mentioned above was ploughed 6 inches deep in fall of 1899. The sod had been broken and back-set in summer of 1899.

EXPERIMENT WITH SPELTZ WHEAT.

A test was made with this variety of bald wheat, in which the husk adheres closely to the kernel. It was sown on clay loam, April 13, and cut September 10. The time to mature was 149 days. Yield of straw, 2,000 pounds ; of grain, 22 bushels per acre; weight per measured bushel, 43½ pounds.

TEST OF BLUE-STONE AS A PREVENTIVE OF SMUT IN WHEAT.

As the efficacy of blue-stone as a preventive of smut in spring wheat has been clearly demonstrated in previous years, this test was made to find if the length of time the seed is allowed to remain in the solution, has any effect on the result. Very smutty Red Fife seed was used.

Seed.	Condition.	Treatment.	On 25 Sq. Feet.	
			Good Heads.	Smutty Heads.
Red Fife	Smutty	1 lb . blue-stone to 15 bush. wheat. Dipped two minutes..	240	5
"	"	1 lb. blue-stone to 5 bush. wheat. Dipped fifteen minutes..	239	0
"	"	Check-plot. Untreated...........................	110	123

TEST OF FERTILIZERS.

Various statements having been made as to the stimulating effect of certain fertilizers on the young grain plants, if sown with or shortly after the seed, six plots of summer-fallow, of one-fortieth of an acre each, well sheltered from winds by maple hedges, were chosen and sown on April 18, with Red Fife wheat, by drill, at the rate of 1½ bushels per acre, and treated as per statement below.

It will be noticed that the plots treated with a mixture of the fertilizers gave slightly the better yield, but at no time while the grain was standing was the effect of any of the fertilizers at all apparent.

SEED, RED FIFE—TEST OF FERTILIZERS.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
			In.		In.		Lbs.	Bush. Lbs.
Plot No. 1.								
Nitrate of soda, 100 lbs. per acre. (½ sown when grain was 2 in. high, balance when 6 in. high)	Aug. 16.	120	35	Strong..	4	Bald .	1760	27 20
Plot No. 2.								
Nitrate of soda, 200 lbs. per acre. (½ sown when grain was 2 in. high, balance when 6 in. high)	Aug. 16.	120	34	" ..	3½	" .	1760	27 20
Plot No. 3.								
Superphosphate No. 1, 400 lbs. per acre. (Sown before grain and harrowed)	Aug. 16.	120	31	" ..	3¾	" .	1600	30
Plot No. 4.								
Check-plot. Unfertilized	Aug. 16.	120	31	" ..	3½	" .	1740	27 40
Plot No. 5.								
Muriate of potash, 200 lbs. per acre. (Sown before grain and harrowed)	Aug. 16.	120	33	" ..	3½	" .	1960	30 40
Plot No. 6.								
Superphosphate No. 1, 200 lbs. per acre. Muriate of potash, 100 " " Nitrate of soda, 100 " " (½ sown before grain and harrowed, balance when grain was 2 in. high.)	Aug. 16.	120	30	" ..	3½	" .	1860	32 20

EXPERIMENTS WITH OATS.

Fifty-nine varieties of oats were sown on fallow-land on May 1 by hoe-drill, 2 inches deep, at the rate of 2½ bushels per acre; plots, one-twentieth acre; soil, clay loam.

All were completely destroyed by wind and dry weather, and on June 4 nine of the most severely injured, at that time, were resown. On June 13 the balance had entirely succumbed and were re-seeded.

Had all been resown on June 4 good returns would, no doubt, have been secured from all the varieties, but the greater number of plots had been allowed to remain until the 13th in the hope that they would recover. The heavy winds and drouth, however, continued and re-seeding had to be done, but it proved too late, as the plots were uncut when frost came on September 13 and were rendered useless except for fodder, of which, however, a heavy and fine crop was secured. Five pounds of twine per acre was required to bind the crop. Under the circumstances these results give no reliable indication as to the relative productiveness of the varieties.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1 Improved American........	Sept. 7.	95	48	Strong..	9	Branching	4,600	76	16	37
2 Early Blossom........	" 17.	105	50	" ..	11	Sided.....	4,700	64	24	35
3 Improved Ligowo........	" 10.	98	50	" ..	7½	Branching	4,700	61	26	37½
4 Wide-awake........	" 7.	95	45	" ..	8	" .	4,820	61	6	38½
5 Banner........	" 17.	105	45	" ..	8½	" .	5,380	59	14	33
6 Abundance........	" 17.	105	40	" ..	8	" .	5,180	58	28	34
7 Bavarian........	" 17.	105	40	" ..	10	" .	4,700	57	22	32½
8 Early Archangel........	" 7.	95	47	" ..	10	" .	5,080	56	16	39
9 Bonanza........	" 7.	95	38	Medium	10½	" .	4,200	32	12	41½

The other fifty varieties which were resown June 15 were a complete failure owing to winds, dry weather and frost.

OATS—ACRE AND FIELD LOTS.

Fifteen varieties were sown from April 26 to May 1 on clay loam, six of which were blown out and had to be re-sown. Frost on September 13 rendered these fields useless except for feed, of which a very heavy crop was secured.

With the exception of one field of 9½ acres of Banner oats, which was protected by trees and the railway bank, all the fields not entirely killed, were more or less thinned by winds and produced very small crops.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Acres.				In.		In.		Lbs.	Bush.	Lbs.	Lbs
Banner........	9	April 26..	Aug. 10..	106	51	Strong..	9	Branching	5,100	55	..	36½
American Beauty......	1	May 1..	" 13..	104	43	" ..	7½	" ..	4,000	30	26	35½
Banner.	2	April 30..	" 13..	105	41	" ..	8½	" ..	4,100	27	2	35
Improved Ligowo.....	2½	" 30..	" 3..	95	43	" ..	7	" ..	4,340	25	18	36½
Wide-awake..........	2½	" 30..	" 14..	106	38	" ..	7	" ..	3,600	23	22	35½
Abundance...........	2½	" 30..	" 14..	106	37	" ..	8½	" ..	3,330	23	22	34½
Siberian O. A. C......	1	May 1..	" 14..	105	38	Medium	7½	" ..	3,200	22	6	33½
New Zealand..........	½	" 1..	" 14..	105	45	Strong..	11	" ..	3,680	19	28	31
Thousand Dollar	½	" 1..	" 14..	105	40	" ..	8	" ..	3,040	16	14	30
Bavarian...........	½	" 1..	" 11..	102	35	Medium	7	" ..	2,400	15	12	32
		Sown.	Re-sown.									
Holstein Prolific	2	April 30 .	June 15..	*								
White Schonen........	2	" 30..	" 15..	*								
Bonanza.......	2	" 30..	" 15..	*								
Oderbruch...........	2	May 1..	" 15..	*								
Columbus............	2	April 30..	" 15..	*								
Golden Beauty......	1	May 1..	" 15..	*								

* Frozen on September 13; cut for fodder.

TEST OF FORMALIN AND MASSEL POWDER FOR THE PREVENTION OF SMUT IN OATS.

The seed used in this test was considerably affected with smut and the result of the test indicates that to be entirely effectual, the solution of Formalin should be applied to the seed for at least one hour.

Where the Massel powder and lime were used, no smutty heads were found. When the smutty grain was soaked in Formalin for one hour, the treatment was equally effective.

Seed.	Condition.	Treatment.	On 25 Sq. Feet.	
			Good Heads.	Smutty Heads.
Doncaster Prize...	Smutty.	Formalin $4\frac{1}{2}$ oz. to 10 galls. water ; soaked 1 hour	180	0
" ...	" .	" " " " 15 minutes	179	32
" ...	" .	" " " " 5 "	161	39
" ...	" .	" 6 " " " 5 "	191	59
" ...	" .	" 9 " " sprinkled......... .. .	201	39
" ...	" .	Check plot ; untreated	165	94
Bavarian	" .	Massel powder 4 oz., lime 2 lbs., water 2 galls. ; sprinkled..	259	0

EXPERIMENTS WITH BARLEY.

Thirty varieties of 6-rowed and twenty varieties of 2-rowed barley were sown on one-twentieth of an acre plots of fallow-land, on May 7 and 8, by hoe-drill, two inches deep, at the rate of two bushels seed per acre. Soil, clay loam.

All came up well and were several inches high when struck by successive winds and dry weather, which completely destroyed every plot. On June 4, a number of the weakest were re-sown, and when the balance had succumbed on June 13, the re-seeding was completed. The late sown, however, did not ripen, and was cut for fodder, of which an immense crop was secured. Under the circumstances these results give no reliable indication as to the relative productiveness of varieties.

BARLEY—TWO-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing, May 7 & 8.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
		Re-sown.			In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Sidney........	June 4..	Sept. 18..	106	34	Strong..	$3\frac{1}{2}$	3,600	34	8	53
2	Nepean......	" 4..	" 17..	105	37	" ..	$3\frac{1}{4}$	3,880	28	16	
3	Kirby..........	" 4..	" 18..	106	35	Medium	4	3,180	27	24	
4	Clifford	" 4..	" 18..	106	42	Strong..	3	4,080	20	40	
5	Dunham	" 4..	" 18..	106	40	Medium	$3\frac{1}{2}$	3,800	20	20	
6	Fulton..	" 4..	" 18..	106	40	Strong..	$3\frac{1}{2}$	3,940	20	..	$46\frac{1}{2}$
7	Jarvis.......	" 4..	" 18..	106	44	" ..	6	4,200	15	..	
8	Canadian Thorpe	" 4..	" 12..	100	30	" ..	3	3,280	15	..	51

The remaining twelve varieties, re-sown June 13, were a complete failure, owing to winds, dry weather and frost.

BARLEY—SIX-ROWED—TEST OF VARIETIES SOWN ON SAME DATE.

Number.	Name of Variety.	Date of Sowing May 7-8	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per acre.		Weight per Bushel.
		Resown.			Inch.		Inch.	Lbs.	Bush.	Lbs.	Lbs.
1	Odessa..........	June 4..	Aug. 30..	87	36	Strong......	3	3,560	55	..	48
2	Mensury.........	" 4..	" 30..	87	35	"	3	4,000	54	8	50
3	Common..........	" 4..	" 27..	84	34	"	3	2,560	50	40	52
4	Rennie's Improved.	" 4..	" 30..	87	33	"	2¼	4,400	46	12	49
5	Petschora.........	" 4..	Sept. 18..	106	35	"	3	3,800	42	4	..
6	Royal............	" 4..	Aug. 30..	87	33	"	3¼	3,200	41	32	50
7	Trooper..........	" 4..	" 31..	88	32	"	2¾	3,080	40	..	49½
8	Surprise..........	" 4..	Sept. 18..	106	29	Medium....	4¾	2,800	38	36	..
9	Blue Long Head...	" 4..	" 17..	105	40	Strong.,....	4	3,420	37	4	41
10	Summit..........	" 4..	" 18..	106	40	"	3	3,240	36	32	49
11	Pioneer..........	" 4..	" 18..	106	38	"	3¼	3,640	36	12	..
12	Stella............	" 4..	" 18..	106	33	"	3	3,420	33	36	..
13	Vanguard.........	" 4..	" 12..	100	34	Medium ...	3	3,600	33	16	49
14	White Hulless.....	" 4..	" 10..	98	24	Strong......	2½	3,680	31	32	55
15	Brome	" 4..	" 18..	108	40	"	3	3,240	30	40	..
16	Nugent...........	" 4..	" 18..	108	34	"	2¾	3,440	27	24	..
17	Garfield..........	" 4..	" 18..	108	44	"	3¼	4,180	25	20	44
18	Phœnix...........	" 4..	" 10..	98	29	"	2¾	4,220	24	28	49½

The remaining twelve varieties, re-sown June 13, were a complete failure, owing to winds, dry weather and frost.

FIELD AND ACRE PLOTS.

Twelve varieties were sown on fallow-land, and, in addition, Sidney, one of the same varieties, was sown on Brome back-setting. The soil was clay loam. All but Sidney were destroyed. Seven of the fallow plots were re-sown on June 4, and the balance on June 13.

The varieties sown on the former date ripened ; the latter were cut for fodder, after frost on September 13.

BARLEY.—ACRE AND FIELD LOTS, SOWN MAY 7 AND 8.

Name of Variety.	Size of Plot.	Resown.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of growth.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs
Mensury..........	1 acre..	June 4..	Aug. 27.	84	31	Strong..	3	6 rowed.	3330	49	30	48½
Royal	1 " ..	" 4..	" 27.	84	33	Medium	3	6 " .	3600	47	20	47⅓
Odessa	¾ " ..	" 4..	Sept. 12	100	37	Strong..	2¾	6 " .	3520	37	16	49½
Oderbruch	¾ " ..	" 4..	Aug. 27.	84	30	Medium	2¾	6 " .	3000	36	..	....
Canadian Thorpe..	1 " ..	" 4..	Sept. 17	105	35	Strong..	3½	2 " .	3600	35	42	50
Sidney (on Brome Sod, broken and backset 1899)....	3½ " ..	Sown. May 7..	Aug. 15.	100	37	" ..	4½	2 " .	3420	32	40	52
Trooper	1 " ..	Resown. June 4..	" 27.	84	32	" ..	3	6 " .	2800	32	24	48¾
Rennie's Improved	1 " ..	" 4..	" 27.	84	29	" ..	3	6 " .	2660	32	4	50
		Sown...	Resown.									
Sidney	1 " ..	May 8..	June 13.	Frozen on Sept 13. Cut for fodder.								
Beaver	2 " ..	" 8..	" 13.									
Common..........	1 " ..	" 7..	" 13.									
Bolton....... ...	1 " ..	" 8..	" 13.									
French Chevalier	1 " ..	" 7..	" 13.									

TEST OF FORMALIN AND MASSEL POWDER FOR THE PREVENTION OF SMUT IN BARLEY.

The seed used was uniformly smutty. The grain grown on check-plot was very smutty, and totally unfit for any purpose except feed.

Seed.	Condition.	Treatment.	On 25 Sq. Feet.	
			Good Heads.	Smutty Heads.
Odessa	Smutty.	Formalin $4\frac{1}{2}$ oz. to 10 galls. water; soaked 1 hour.	185	0
"	"	" " " " 15 minutes	167	0
"	"	" " " " 5 "	191	5
"	"	" 9 " " sprinkled	181	0
"	"	" 6 " " soaked 5 minutes.	165	0
"	"	Check plot; untreated	176	27
Canadian Thorpe	"	Massel powder 4 oz., lime 2 lbs., water 2 galls.; sprinkled.	209	0

EXPERIMENTS WITH PEASE.

Fifty-seven varieties were sown on one-twentieth acre plots of fallow-land, on May 10, by hoe-drill, at the rate of 2 bushels small, 3 bushels medium, and $3\frac{1}{2}$ bushels large pease per acre. Soil, clay loam.

Only sixteen varieties escaped destruction by winds and dry weather.

Those destroyed were re-sown on June 14, but did not mature before frost came on September 13. A heavy crop of straw was, however, secured for fodder.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of ripening.	Number of days maturing.	Character of growth.	Length of Straw.	Weight of Straw.	Length of pod.	Size of pea.	Yield per Acre.	
						In.	Lbs.	In.		Bush.	Lbs.
1	Pearl		Aug. 25.	107	Strong	41	4,800	3	Large	33	..
2	Prince		" 26.	108	"	40	6,000	$2\frac{3}{4}$	Small	32	40
3	Perth		" 25.	107	Medium	33	4,400	$2\frac{1}{2}$	Medium	32	20
4	Prussian Blue		" 27.	109	Strong	44	5,400	3	"	28	20
5	Elder		" 31.	113	"	38	4,400	$2\frac{1}{4}$	Large	27	20
6	Elliot		" 28.	110	"	42	4,600	$2\frac{3}{4}$	"	26	40
7	Kent		" 27.	109	"	39	5,200	3	Medium	26	..
8	Golden Vine		" 21.	103	Medium	36	5,600	$2\frac{1}{4}$	Small	25	40
9	Picton		" 24.	106	Strong	35	5,200	3	Large	25	20
10	Pride		" 24.	106	"	47	4,700	$2\frac{1}{2}$	"	25	..
11	Arthur		" 21.	103	"	38	5,000	3	"	23	40
12	Trilby		" 24.	106	"	36	5,400	3	"	23	20
13	Paragon		" 23.	105	"	35	4,200	3	"	20	..
14	Canadian Beauty		" 27.	109	"	38	5,000	$3\frac{1}{4}$	"	20	..
15	Vincent		Sept. 6.	119	Medium	36	3,800	3	Medium	16	..
16	New Potter		Aug. 23.	105	Strong	36	4,300	3	Large	14	..
18	Pease—Golden Vine	May 16.				23	Ploughed under July 28 in pod.				
19	Tares	" 16.				13	" " " 28 "				
20	Red Clover	" 16.	Resown June 18			7	" " Sept 10 "				
21	Alsike and Lucerne	" 16.				26	" " " "				
22	Fallow	Ploughed June 6 and cultivated several times to keep weeds down.									

The remaining forty-one varieties were a complete failure owing to winds, dry weather and frosts.

NOTE.—Plots No. 17 to 21 inclusive, were harrowed after ploughing.

EXPERIMENTS WITH INDIAN CORN.

Thirty-one varieties of Indian Corn were sown, in rows 32 inches apart, and planted in hills 32 inches apart each way, on May 19. Soil, clay loam.

The hills were protected by a hedge, and produced a very satisfactory crop, but the rows, which were on an exposed portion of the field, were repeatedly swept by winds, and injured to such an extent that the late rains did no good.

The yield of hills was computed from the weight of two rows, each 66 feet long.

Indian Corn—Test of Varieties.

Number.	Name of Variety.	Character of Growth.	Height.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when Cut.	Weight per Acre. Grown in Hills.	
			Inches.						Tons.	Lbs.
1	Early Yellow Long-eared	Strong....	93	Aug. 18..	Aug. 30.	Sept. 5.	......	Early milk	18	960
2	Angel of Midnight......	Medium..	86	" 20..	" 30.	" 5.	......	" .	18	190
3	Thoro'bred White Flint..	Strong....	83	" 20..	" 28.	....	......	Tassel ...	17	1,420
4	Early Mastodon........	"	93	" 20..	Sept. 1.	....	......	Silk......	16	1,110
5	Mammoth 8-rowed Flint.	Medium..	88	" 20..	" 1.	Sept. 5.	......	Early milk	16	1,110
6	Compton's Early........	" ..	89	" 20..	" 1.	" 5.	......	" .	16	340
7	Longfellow..	Strong....	85	" 15..	Aug. 30.	....	......	Silk......	16	340
8	Champion White Pearl..	"	99	Sept. 1..	....	....	......	Tassel....	15	1,570
9	Cloud's Early Yellow...	"	90	Aug. 25..	Sept. 1.	....	......	Silk......	15	800
10	Canada White Flint....	"	89	" 18..	Aug. 30.	Sept. 7.	......	Early milk	15	30
11	Mammoth Cuban.......	"	91	" 20..	Sept. 1.	....	......	Silk......	15	30
12	Evergreen Sugar........	Medium..	82	" 25..	....	....	......	Tassel....	14	1,260
13	Selected Leaming.......	Strong....	95	" 18..	Sept. 1.	Sept. 7.	......	Early milk	14	1,260
14	Early Butler...........	"	92	" 15..	Aug. 25.	" 1.	Sept. 7	Late milk.	14	490
15	Superior Fodder........	"	92	" 25..	Sept. 1.	" 7.	......	Early milk	14	260
16	North Dakota White....	"	79	" 15..	Aug. 30.	" 5.	......	" .	14	260
17	Giant Prolific Ensilage..	Medium..	88	" 25..	....	....	......	Tassel....	13	1,720
18	Pearce's Prolific.........	" ..	82	" 10..	Aug. 25.	Sept. 1.	Sept. 7	Late milk.	13	950
19	Red Cob Ensilage.......	Strong....	74	" 30..	....	....	......	Tassel....	13	950
20	Sanford................	"	86	" 20..	Sept. 1.	Sept. 7.	......	Early milk	13	720
21	North Dakota Yellow...	Weak	66	" 18..	" 1.	" 7.	......	" .	13	180
22	King of the Earliest....	Medium..	85	" 25..	" 1.	....	......	Tassel....	13	180
23	Mitchell's Extra Early..	Weak	69	" 10..	Aug. 25.	Sept. 1.	......	Early milk	12	1,410
24	Pride of the North......	Strong....	86	" 25..	Sept. 1.	" 5.	......	" .	12	1,410
25	White Cap Yellow Dent	"	92	" 15..	Aug. 30.	" 7.	......	" .	12	640
26	Country Gentleman.....	"	71	Sept. 1..	....	....	......	Tassel....	11	1,870
27	Kendall's Early Giant..	Medium..	72	Aug. 10..	Aug. 25.	Sept. 1.	......	Early milk	11	1,870
28	Salzer's All Gold........	Strong....	85	" 20..	Sept. 1.	" 7.	......	" .	11	1,100
29	Extra Early Huron Dent	"	92	" 20..	" 1.	" 5.	......	" .	10	20
30	Early Yellow Six Weeks	Weak	64	" 10..	Aug. 25.	" 1.	Sept. 7	Late milk.	9	480
31	Extra Early Szekely....	"	73	" 10..	" 25.	" 1.	" 5	" .	9	480
32	Salzer's Earliest Ripe....	"	59	" 5..	" 20.	" 1.	" 7	" .	9	480

INDIAN CORN IN ROWS AT DIFFERENT DISTANCES.

Three varieties were sown on a plot protected by a hedge, in rows 21, 28, 35 and 42 inches apart, on May 19. The corn was cut for ensilage on September 4. The estimate of the yield is based upon the weight of crop produced on two rows, each 66 feet long.

Indian Head, N.W.T. Planting in front of Superintendent's house.

Indian Corn—Test of Seeding at Different Distances.

Name of Variety.	Distance between Rows.	Character of Growth.	Height.	When Tasselled.	Condition when cut.	Weight per Acre Grown in Rows.	
	Inches.		Inches.			Tons.	Lbs.
Selected Leaming	21	Strong	89	Aug. 25	Early Milk	23	200
" "	28	"	88	" 25	"	17	1,640
" "	35	"	95	" 15	"	15	800
" "	42	"	90	" 20	"	16	1,000
Longfellow	21	Medium	90	" 20	"	18	960
"	28	"	88	" 25	Tassel	19	1,600
"	35	Strong	91	" 15	Early Milk	20	810
"	42	"	89	" 20	"	16	1,600
Champion White Pearl	21	"	88	" 25	Tassel	22	880
" "	28	"	103	" 25	"	22	1,540
" "	35	"	98	" 20	Early Milk	19	1,270
" "	42	"	97	" 20	"	18	1,620

ROTATION OF CROPS.

The plan inaugurated in 1899 for a rotation of crops was followed out this year, but on account of winds and dry weather, the results are far from satisfactory.

Plan for Series of Rotation of Crops Beginning in Spring of 1899.

Plot No.	1899.	1900.	1901.
1	Wheat	Oats	Soja Beans.
2	Wheat	Wheat	Pease.
3	Wheat	Oats	Tares.
4	Wheat	Wheat	Red Clover.
5	Wheat	Barley	Alsike and Lucerne.
6	Pease	Wheat	Wheat.
7	Tares	Wheat	Oats.
8	Soja Beans	Wheat	Oats.
9	Red Clover	Wheat	Wheat.
10	Alsike and Lucerne	Wheat	Barley.
11	Rape	Wheat	Summer-fallow.
12	Wheat	Wheat	Summer-fallow.
13	Wheat	Oats	Summer-fallow.
14	Wheat	Barley	Summer-fallow.
15	Wheat	Wheat	Oats.
16	Wheat	Barley	Oats.
17	Oats	Soja Beans	Wheat.
18	Wheat	Pease	Wheat.
19	Oats	Tares	Wheat.
20	Wheat	Red Clover	Wheat.
21	Barley	Alsike and Lucerne	Wheat.
22	Rye	Summer-fallow	Wheat.

Rotation Test—Second Year 1900—Plots Half Acre Each.

Stubble ploughed five inches deep, last week in October, 1899, and harrowed. Ploughed again before seeding (three inches deep), 1900.

Plot.	Variety.	Soil.	Date of Sowing.	Date of Ripening.	No. Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield of Grain per Acre.	
						in.		in.		Lbs.	Bush	Lbs.
1	Oats	Clay loam.	April 27	Aug. 3	115	18	Stiff	7	Branching	1,220	11	2
2	Wheat, Red Fife	"	" 9	" 8	121	16	"	3	Bald	730	4	20
3	Oats, Banner	"	" 27	" 3	115	18	"	$7\frac{3}{4}$	Branching	1,110	11	..
4	Wheat, Red Fife	"	" 9	" 8	121	15	"	$2\frac{3}{4}$	Bald	850	5	..
5	Barley, Canadian Thorpe	"	May 9	" 20	103	14	Weak	3	Two-rowed	500	9	44
6	Wheat, Red Fife	"	April 9	" 13	126	38	Strong	$3\frac{1}{2}$	Bald	1,960	16	50
7	" "	"	" 9	" 13	126	39	"	$3\frac{1}{3}$	"	2,100	19	30
8	" "	"	" 9	" 13	126	34	"	$3\frac{1}{4}$	"	2,000	18	20
9	" "	"	" 9	" 13	126	24	"	3	"	1,330	11	20
10	" "	"	" 9	" 13	126	21	"	3	....	1,100	8	20
11	" "	"	" 9	" 13	126	21	"	3	....	1,250	10	40
12	" "	"	" 9	" 8	121	21	"	3	Bald	970	7	40
13	Oats, Banner	"	" 27	" 3	115	18	Stiff	$7\frac{3}{4}$	Branching	990	9	14
14	Barley, Canadian Thorpe	"	May 9	" 20	103	15	Weak	3	Two rowed	410	4	32
15	Wheat, Red Fife	"	April 9	" 8	121	16	Stiff	3	Bald	700	4	30
16	Barley, Canadian Thorpe	"	May 9	" 20	103	18	Weak	3	Two rowed	640	9	
17	*Soja Beans	"	" 16	....	....	18	....	....	....	....	....	
18	†Pease, Gold'n Vine	"	" 16	....	....	23	....	....	....	....	....	
19	†Tares	"	" 16	....	....	15	....	....	....	....	....	
20	‡Clov'r, Com'on Red	"	" 16	....	....	7	....	....	....	....	....	
21	‡ " Alsike and Lucerne	"	" 16	....	....	10	....	....	....	....	....	
22	§Fallow	"	....	....	....	....	....	....	....	....	....	

* Ploughed under August 3.
† Ploughed under July 28.
‡ Ploughed under September 10.
§ Ploughed June 6, seven inches deep, and cultivated four times during summer.

Summary of Results for Two Years.

Plot.	Variety.		Yield per Acre.		Variety.		Yield per Acre.	
	1899.		Bush.	Lbs.	1900.		Bush.	Lbs
1	Wheat, Red Fife		36	6	Oats, Banner		11	2
2	"		35	40	Wheat, Red Fife		4	20
3	"		36	...	Oats, Banner		11	
4	"		35	46	Wheat, Red Fife		5	
5	"		35	40	Barley, Canadian Thorpe		9	44
6	Pease, Golen Vine	Ploughed under.	July 20		Wheat, Red Fife		16	50
7	Tares		" 20		"		19	30
8	Soja Beans		" 20		"		18	20
9	Clover, Common Red		Sept 10		"		11	20
10	" Alsike and Lucerne		" 10		"		8	20
11	Rape		Aug. 15		"		10	40
12	Wheat, Red Fife		36	6	"		7	40
13	"		35	36	Oats, Banner		9	14
14	"		35	40	Barley, Canadian Thorpe		4	32
15	"		36	....	Wheat, Red Fife		4	30
16	"		35	20	Barley, Canadian Thorpe		9	4
17	Oats, Banner		85	....	Soja Beans	Ploughed under.	Aug. 3	
18	Wheat, Red Fife		36	16	Pease, Golden Vine		July 28	
19	Oats, Banner		86	24	Tares		"	
20	Wheat, Red Fife		36	...	Clover, Common Red		Sept. 10	
21	Barley, Canadian Thorpe		46	....	" Alsike and Lucerne		"	
22	Rye, Spring		41	....	Fallow			

EXPERIMENTS WITH FLAX.

Sowing different quantities per acre, and at different dates. Soil, clay-loam, summer-fallow. Sown by hoe-drill.

Seed per Acre.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw.	Yield per Acre.	
					In.		Lbs.	Bush.	lbs.
40 lbs.	1/11 acre	May 15	Aug. 20	97	27	Weak	280	*	
80 "	"	" 15	" 20	97	28	Medium	1,260	11	12
40 "	"	" 22	" 20	90	28	Strong	2,170	11	22
80 "	"	" 22	" 20	90	26	"	2,100	12	8
40 "	"	" 29	" 20	83	31	"	1,540	13	18
80 "	"	" 29	" 20	83	28	"	1,680	12	34
40 "	"	June 6	" 31	86	30	"	1,470	12	36
80 "	"	" 6	" 20	75	30	"	1,890	10	44

Experiments were made with buckwheat and tares, but in both instances the crop was destroyed by wind.

EXPERIMENTS WITH MILLETS.

(Plots 1-20th Acre each.)

White Round Extra French,
Moha Hungarian,
Algerian,
Japanese,
Italian,
Pearl,
Golden.

(Sown May 18.)

All except Japanese were killed out by drought.
Japanese, cut for ensilage September 5, in head.
Yield, 12 tons 1,000 pounds per acre.

EXPERIMENT WITH CANARY-GRASS.

(*Phalaris canariensis.*)

Sown May 15 ; cut August 20 ; time to mature 90 days.
Straw, 36 inches long ; heads, 1½ inches long ; straw, strong.
Weight of straw, 3,350 pounds per acre.
Yield per acre, 23 bushels 20 pounds.

EXPERIMENT WITH WHITE FLAX.

(Received from Alfred Boyd, Esq., Toronto, Ont.)
Sown May 22 ; cut September 10 ; straw, 12 inches long.
This flax made a weak growth and ripened very unevenly.

* Destroyed by wind

EXPERIMENT WITH SUNFLOWERS.

(Plot 1-20th Acre.)

Mammoth Russian—Sown May 25 ; frozen September 13 ; height, 7 feet.

A few heads which had matured before frost came were saved but the greater portion of the crop was lost.

EXPERIMENT WITH SPRING RYE.

(Plot 3 Acres.)

Sown May 22 ; cut September 3 ; time to mature 104 days.

Straw, 38 inches long ; growth, strong ; length of head, 4 inches ; yield of straw, 3,800 pounds per acre, of grain, 21 bushels 26 pounds per acre.

EXPERIMENTS WITH HORSE BEANS.

(Sown in rows in 1-20th acre plots on May 18.)

Rows, 21 inches apart ; height of straw, 33 inches ; length of pod, 3 inches ; cut September 10 ; yield, 6 tons 1,800 pounds per acre.

Rows, 28 inches apart ; height of straw, 29 inches ; length of pod, 3 inches ; cut September 10 ; yield, 8 tons 130 pounds per acre.

Rows, 35 inches apart ; height of straw, 35 inches ; length of pod, 3 inches ; cut September 10 ; yield, 8 tons 320 pounds per acre.

EXPERIMENTS WITH SOJA BEANS.

(Sown in rows in 1-20th acre plots on May 18.)

Rows, 21 inches apart ; length of straw, 32 inches ; yield, 8 tons 1,000 pounds per acre.

Rows, 28 inches apart ; length of straw, 31 inches ; yield, 7 tons 600 pounds per acre.

Rows, 35 inches apart ; length of straw, 31 inches ; yield, 7 tons 1,200 pounds per acre.

EXPERIMENTS WITH FIELD BEANS.

(1-20th acre plots, sown May 18 ; frozen September 13.)

Marrowfat—Length of straw, 29 inches ; yield, 5 tons 1,040 pounds per acre.
White Field—Length of straw, 28 inches ; yield, 3 tons 880 pounds per acre.
Mexican Tree—Length of straw, 17 inches ; yield, 1 ton 720 pounds per acre.
California Pea—Length of straw, 15 inches ; yield, 3 tons 880 pounds per acre.

EXPERIMENT WITH TURKESTAN ALFALFA.

(Size of plot, 1-20th acre.)

Sown in sheltered ground on May 22.

Catch good ; growth strong and even ; plants 24 inches high on October 1. This variety promises well.

HAY CROP.

BROME GRASS (*Bromus inermis*).

The seedings of Brome grass made previous to 1899 were too short to cut for hay, but after July 4, when rains commenced, good pasture was afforded by all the fields.

The seeding of 1899 was cut for seed on July 23. The seed was of excellent quality, but the crop was very light—85 pounds per acre.

Seeding—1900.

Ten acres were sown April 27, re-sown June 26. Good catch and the grass is in splendid condition for winter.

WESTERN RYE-GRASS (*Agropyrum tenerum*).

Old meadow too short to cut. Pastured after July 5.
The seeding of 1899 was cut for seed on July 28.
Seed of good quality, but the crop was very light.

Seeding—1900.

Four acres Western Rye grass, sown April 28. Re-sown June 26. A good catch.

Mixture of Brome grass and Western Rye grass. Five acres sown April 26. Resown June 25. A good catch.

SEEDING AND CULTIVATION OF BROME GRASS.

For information regarding the seeding and cultivation of Brome grass the following is quoted from the report of 1896 :—

'This grass is better sown alone ; at least it should not be sown with a grain crop. The grain takes too much moisture from the young grass-plants, only the most vigorous of which will survive the dry weather in September ; whereas, if sown alone all the plants have an equal chance.

'It is advisable to sow the seed on land that does not blow. Summer-fallow would be the best preparation, but on account of its liability to drift it is not safe in many parts of the Territories to use this kind of land. Stubble-land ploughed three or four inches deep in April or May, and well harrowed after the seed is sown is found to be quite safe from winds, as the stubble harrowed to the top prevents all drifting.

'Ten or twelve pounds of seed is required per acre. More seed will give a better crop the first year, but less afterwards, as the roots thicken up each year, and in three or four years this grass makes better pasture than hay.

'The seed being light, long and thin, seeding by hand is the only practicable method unless seeders constructed for the purpose are available. To seed properly a calm day should be chosen, so that all parts of the land may be evenly sown.

'While the plants are young, weeds are sure to make great headway, and it is necessary to keep them at least from going to seed. The quickest way to accomplish this is to go over the field with a mower, cutting just above the grass plants. If this operation has to be repeated it will be necessary to cut the tops of the grass, but this will not injure the plants, in fact it is an advantage in the way of giving the roots a firmer hold.

'The first crop of hay can be cut the next year after seeding, and will, in ordinary years, be ready early in July. Twenty days after being ready to cut for hay it will be fit to cut for seed if so desired.

'On this farm it has always been cut in first bloom for hay, and twenty days from this time it is considered in proper condition to cut for seed.

'In cutting for seed, a binder is used and the grass is cut, tied and stooked the same as wheat or other grain. In a week or ten days after cutting it is ready to thresh or store away.

'For threshing small quantities, the old fashioned flail is suitable, but for large lots a threshing machine should be used on which the wind has been shut off as much as practicable. From three to six hundred pounds of seed may be expected from an acre.'

EXPERIMENTS WITH FIELD ROOTS.

The root crop was, on the whole, a poor one. Turnips and mangels, while sound and good, were small; sugar-beets were small and carrots an entire failure, the seed not germinating till the end of July. Turnips and mangels were considerably injured by drifting earth cutting the young leaves.

The land used for roots was a clay loam, fallowed in 1899, and ploughed and harrowed before seeding, which, on account of the top soil drying out, proved detrimental to germination. Two sowings were made in each case, the second sowing about a week later than the first. The yield per acre has been calculated from the weight produced from two rows, each 66 feet long. In the following tables the results are given of the testing of twenty-eight varieties of turnips, twenty-two of mangels, and six of sugar beets :—

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre.—1st Plot.		Yield per Acre.—1st Plot.		Yield per Acre.—2nd Plot.		Yield per Acre.—2nd Plot.	
						Tons	lbs.	Bush.	lbs.	Tons	lbs.	Bush.	lbs.
1	Drummond PurpleTop	May 18.	May 25.	Oct. 8..	Oct. 8..	20	545	675	45	8	1580	293	..
2	Perfection Swede.....	" 18.	" 25.	" 8..	" 8..	20	410	773	30	15	1590	526	30
3	Champion Purple Top.	" 18.	" 25.	" 8..	" 8.	19	1675	661	15	8	1040	284	..
4	Halewood's BronzeTop	" 18.	" 25.	" 8..	" 8..	19	1675	661	15	14	20	467	..
5	East Lothian........	" 18.	" 25.	" 8..	" 8..	19	1000	650	..	14	560	476	..
6	Carter's Elephant.....	" 18.	" 25.	" 8..	" 8..	19	310	638	30	6	1740	229	..
7	Webb's New Renown.	" 18.	" 25.	" 8..	" 8..	19	310	638	30	20	1625	693	45
8	Mammoth Clyde.. ...	" 18.	" 25.	" 8..	" 8..	17	1700	595	..	13	400	440	..
9	Bangholm Selected ...	" 18.	" 25.	" 8..	" 8..	17	1565	592	45	12	315	405	15
10	Hartley's Bronze	" 18.	" 25.	" 8..	" 8..	17	350	572	30	10	235	377	15
11	Hall's Westbury......	" 18.	" 25.	" 8..	" 8..	17	80	568	..	12	999	416	30
12	Giant King	" 18.	" 25.	" 8..	" 8..	16	1675	561	15	9	1485	327	45
13	Skirving's...........	" 18.	" 25.	" 8..	" 8..	16	400	540	..	15	780	513	..
14	Selected Champion ...	" 18.	" 25.	" 8..	" 8..	15	1995	533	15	15	1590	526	30
15	Selected Purple Top..	" 18.	" 25.	" 8 :	" 8.	15	1590	526	30	15	240	504	..
16	Prize Puple Top....	" 18.	" 25.	" 8..	" 8.	15	375	506	15	13	1480	458	..
17	Marquis of Lorne.....	" 18.	" 25.	" 8..	" 8..	15	240	504	..	14	560	476	..
18	Prize Winner......	" 18.	" 25.	" 8..	" 8..	14	1505	491	45	9	525	308	45
19	Shamrock Purple Top.	" 18.	" 25.	" 8..	" 8..	14	1505	491	45	11	1040	384	..
20	Monarch.	" 18.	" 25.	" 8..	" 8..	14	1235	487	15	9	990	316	30
21	West Norfolk RedTop.	" 18.	" 25.	" 8..	" 8..	14	290	471	30	15	1320	522	..
22	Sutton's Champion....	" 18.	" 25.	" 8..	" 8..	13	670	444	30	16	400	540	..
23	New Arctic	" 18.	" 25.	" 8..	" 8..	12	315	405	15	8	350	272	30
24	Elephant's Master....	" 18.	" 25.	" 8..	" 8..	11	905	381	45	13	130	435	30
25	Imperial Swede.......	" 18.	" 25.	" 8..	" 8..	11	770	379	30	22	385	739	45
26	Kangaroo	" 18.	" 25.	" 8..	" 8..	10	70	334	30	7	415	240	15
27	Magnum Bonum....	" 18.	" 25.	" 8..	" 8..	8	1850	297	30	10	1825	363	45
28	Jumbo.	" 18.	" 25.	" 8..	" 8..	8	1175	286	15	12	1395	423	15

Mangels—Test of Varieties.

Number.	Name o Variety,	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons	Lbs	Bus.	Lbs.	Tons	Lbs	Bus.	Lbs.
1	Champion Yellow Globe..	May 18.	May 25.	Sept. 28	Sept. 28	26	720	879	..	13	820	447	
2	Canadian Giant..........	" 18.	" 25.	" 28	" 28	24	1,590	826	30	11	740	379	
3	Gate Post..........	" 18.	" 25.	" 28	" 28	23	1,670	794	30	18	1,950	632	30
4	Giant Yellow Intermediate	" 18.	" 25.	" 28	" 28	20	1,370	689	30	16	370	539	30
5	Giant Yellow Globe......	" 18.	" 25.	" 28	" 28	20	5	666	45	13	160	436	
6	Giant Ye)low Half-long...	" 18.	" 25.	" 28	" 28	19	1,465	657	45	12	1,200	420	
7	Mammoth Long Red.	" 18.	" 25.	" 28	" 28	19	640	644	..	21	1,980	733	
8	Prize Mammoth Long Red	" 18.	" 25.	" 28	" 28	18	860	614	..	18	1,815	630	15
9	Gate Post Yellow.........	" 18.	" 25.	" 28	" 28	18	30	605	..	11	1,160	386	
10	Norbiton Giant...........	" 18.	" 25.	" 28	" 28	17	935	582	15	19	910	648	30
11	Mammoth Oval Shaped...	" 18.	" 25.	" 28	" 28	16	1,840	564	..	16	1,330	555	30
12	Selected Mammoth Long Red...................	" 18.	" 25.	" 28	" 28	16	1,330	555	30	23	590	776	30
13	Mammoth Yellow Intermediate	" 18.	" 25.	" 28	" 28	16	335	538	45	13	715	445	15
14	Half-long Sugar White...	" 18.	" 25.	" 28	" 28	13	1,270	454	30	15	1,920	532	
15	Warden Orange Globe.....	" 18.	" 25.	" 28	" 28	13	505	441	45	16	370	539	30
16	Half-long Sugar Rosy.....	" 18	" 25.	" 28	" 28	12	1,740	429	..	15	1,500	525	
17	Golden Fleshed Tankard..	" 18.	" 25.	" 28	" 28	12	1,620	427	..	12	660	411	
18	Yellow Intermediate......	" 18.	" 25.	" 28	" 28	12	1,080	418	..	18	570	609	30
19	Ward's Long Oval-shaped.	" 18.	" 25.	" 28	" 28	12	795	413	15	15	1,500	525	
20	Lion Yéllow Intermediate.	" 18.	" 25.	" 28	" 28	10	1,090	351	30	17	1,490	591	30
21	Yellow Fleshed Tankard..	" 18.	" 25.	" 28	" 28	7	520	242	..	12	795	413	15
22	Red Fleshed Tankard.....	" 18.	" 25.	*	*								

Sugar-Beets—Test of Varieties

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons	Lbs	Bus.	Lbs.	Tons	Lbs	Bus.	Lbs.
1	Red Top Sugar...........	May 18.	May 25.	Sept. 28	Sept. 28	12	930	415	30	15	1,125	518	45
2	Improved Imperial.......	" 18.	" 25.	" 28	" 28	11	1,295	388	15	9	1,860	331	
3	Wanzleben...........	" 18.	" 25.	" 28	" 28	11	740	379	..	12	1,740	429	
4	Danish Red-top.........	" 18.	" 25.	" 28	" 28	11	50	367	30	12	1,620	427	
5	Vilmorin's Improved......	" 18.	" 25.	" 28	" 28	10	1,090	351	30	11	1,970	399	30
6	Danish Improved.........	" 18.	" 25	" 28	" 28	10	970	349	30	10	10	333	30

EXPERIMENTS WITH POTATOES.

Eighty-two varieties of potatoes were planted on a low, damp plot of summer-fallow, which gave the seed a good start, and, on the whole, the crop was the most satisfactory ever grown on the farm. The growth of all varieties was very even, and the tubers very sound and large. The land was ploughed and harrowed immediately previous to planting. They were planted on May 14. The yield per acre has been calculated in each case from the weight of tubers obtained from two rows, each 66 feet long. No rot has occurred this season on any of the varieties under trial.

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* Did not germinate.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Average Size.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Rochester Rose	Strong	Very large	722		708	15	13	45	Long, red.
2	American Wonder	Very strong.	″	662		607	15	54	45	″ white.
3	American Giant	″	Large	656		608		48		″ ″
4	Empire State	″	″	607	15	552	30	54	45	″ ″
5	Seattle	″	Small	607	15	518	15	89		″ flat, white.
6	Beauty of Hebron	Strong	″	598	15	568	30	29	45	Oval, red.
7	Uncle Sam	Very strong.	Very large	579	45	536	30	43	15	Long, white.
8	Irish Daisy	″	Small	573		516		57		″ ″
9	State of Maine	″	Large	570	45	552	30	18	15	″ ″
10	Delaware	Strong	Very large	570	45	543	30	27	15	″ ″
11	New Variety No. 1	Very strong.	″	561	30	536	30	25		Oval, ″
12	Carman No. 1	″	Large	559	15	534	15	25		Long. ″
13	Vick's Extra Early	Strong	″	556	30	508	30	48		″ pink.
14	I. X. L	Very strong.	Very large	552	30	525	15	27	15	″ red.
15	Everett	Strong	Large	550	45	477	15	73	30	Oval, pink.
16	Pearce's Prize Winner	″	Very large	545	30	518	15	27	15	Long, white.
17	Columbus	Very strong.	Large	541		520	30	20	30	″ oval, red.
18	General Gordon	Medium	Very large	522	45	481	45	41		″ red.
19	Brownell's Winner	Strong	Large	513	30	488	30	25		″ ″
20	Penn Manor	″	″	511	15	470	15	41		Oval, flat, red.
21	Bovee	Medium	Medium	508	30	475		33	30	″ red.
22	Troy Seedling	Strong	″	507		461	15	45	45	Long, oval. white.
23	Prize Taker	Very strong.	″	502	30	479	30	23		Oval, red.
24	Rural Blush	″	″	501	15	476	15	25		″ ″
25	Country Gentleman	Strong	Very large	495	30	449	45	45	45	Long, pink.
26	Burnaby Seedling	Very strong.	″	495	30	443		52	30	″ red.
27	Early Six Weeks	Weak	Medium	488	30	452		36	30	Oval, red.
28	Reeve's Rose	Strong	Large	485		448	30	36	30	″ ″
29	Lee's Favorite	″	″	481		447	30	33	30	Long, red.
30	Seedling No. 7	Very strong.	″	481		436		45		″ ″
31	Carman No. 3	″	″	478	45	442	15	36	30	Oval, white.
32	Rose No. 9	Strong	″	474	45	431	30	43	15	Long, red.
33	Late Puritan	Very strong.	″	472	45	427		45	45	″ white.
34	Polaris	Medium	″	470	15	449	45	20	30	Oval, ″
35	Sharpe's Seedling	Strong	″	468	15	438	30	29	45	Long, oval, red.
36	Northern Spy	Very strong.	″	465		461		4		″ flat. red.
37	Irish Cobbler	Medium	″	465		431	30	33	30	Oval, white.
38	New Queen	Strong	Very large	462	15	448	30	13	45	″ red.
39	Chicago Market	Medium	Medium	462	15	429	15	33		″ white.
40	White Beauty	″	″	461	30	434		27	30	″ flat, white.
41	Pride of the Market	Strong	″	460	15	427		33	15	Long, white.
42	Holborn Abundance	Very strong.	″	459		385	45	73	15	Oval, ″
43	Vanier	″	Large	452		417	45	34	15	Long, red.
44	Lizzie's Pride	″	Medium	452		436		16		″ white.
45	Early Harvest	Medium	Large	440	45	411		39	45	Oval, ″
46	Thorburn	″	Medium	440	45	413	15	27	30	″ red.
47	Dakota Red	Very strong.	Very large	436		395		41		Long, red.
48	Bill Nye	Strong	Medium	433	45	385	15	48		″ flat, white.
49	Maule's Thorobred	″	″	431	15	404		27	15	″ oval, red.
50	Houlton Rose	Medium	Large	424	30	372		52	30	″ red.
51	Early Sunrise	Very strong.	Medium	422	30	392	45	29	45	″ ″
52	Dreer's Standard	Very strong	Medium	418		372	15	45	45	Long, white.
53	Clarke's No. 1	Strong	″	418		372	15	45	45	Long, red.
54	Cambridge Russet	″	″	417	45	383	30	34	15	Long, flat, white
55	Seedling No. 230	″	Large	417	45	404	..	13	45	Round, white.
56	Maggie Murphy	″	Medium	410	45	392	30	18	15	Oval, red.
57	Hale's Champion	″	Large	408	45	363	..	45	45	Oval, white.
58	Wonder of the World	Medium	Medium	408	45	363	..	45	45	Oval, red.
59	Early Puritan	″	″	408	45	379	..	29	45	Oval, white.
60	Earliest of All	Strong	Large	408	45	386	..	22	45	Long, pink.
61	Rural No. 2	Very strong	″	397	30	374	30	23	..	Long, white.
62	Daisy	Medium	Medium	397	30	360	45	36	45	Long, oval, red.
63	Brown's Rot-proof	Strong	″	396	..	350	15	45	45	Long, red.
64	Burpee's Extra Early	Weak	″	388	..	335	30	52	30	Oval, red.

Name of Variety.	Character of Growth.	Average Size.	Total Yield Per Acre.		Yield Per Acre of Marketable.		Yield Per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
65 Quaker City	Very strong	Large	388	..	372	..	16	..	Long, white.
66 Early Market	Weak	"	379	..	356	15	22	45	Long, oval, red.
67 Early Rose	Medium	"	372	15	326	30	45	45	Long, red.
68 Early White Prize	"	"	369	45	315	..	54	45	Oval, white.
69 Clay Rose	Very strong	Medium	358	15	333	15	25	..	Long, oval, red.
70 Reading Giant	Medium	Small	354	45	287	45	57	..	Long, red.
71 Flemish Beauty	Strong	Large	348	30	324	15	24	15	" "
72 Ohio Junior	Weak	Medium	348	30	315	..	33	30	Oval "
73 Great Divide	Medium	Small	344	45	283	15	61	30	Long, flat, white
74 Green Mountain	Strong	Medium	342	30	299	..	43	30	Long, white.
75 Pearce's Extra Early	Weak	Large	331	..	296	45	34	15	Oval, red.
76 Early Ohio	"	Medium	312	45	287	45	25	..	Round, red.
77 Early Michigan	"	Large	312	45	383	..	29	45	Oval, flat, brown
78 Sir Walter Raleigh	Strong	"	308	15	285	30	22	45	Oval, white.
79 Swiss Snowflake	Medium	Small	308	15	248	45	59	30	Round, white.
80 Early Norther	"	"	294	30	269	30	25	..	Long, pink,
81 Moneymaker	Very strong	"	283	..	194	..	89	..	Long, flat, white
82 McIntyre	"	"	217	..	187	15	29	45	Long. pink.

VEGETABLE GARDEN.

On account of the protracted dry weather, all garden vegetables made poor progress, in fact, very little seed germinated in the open until after July 4, when the rains commenced. This made a very short season, and vegetables of all kinds were a comparative failure.

Cabbage did fairly well, but on account of too rapid growth during August, almost all the varieties split, and were more or less spoiled. Celery grew very large, but the stalks rusted badly. Cauliflower did well. Onions were a very light crop, a large portion of the seed failing to germinate. Melons and citrons were a complete failure. Squash and marrows did well, but were not as prolific as usual. Beets, carrots and turnips germinated very badly, and the roots that did grow were coarse and stringy. Lettuce and radish were a complete failure till after the rains commenced, and pease were almost as bad.

ASPARAGUS.

Conover's Colossal.—In use May 1 to July 15. Light crop.
Donald's Elmira.—In use May 1 to July 19. Light crop.
Barr's Mammoth.—In use May 1 to July 19. Light crop.

New Seeding.

Columbian Mammoth White (Ferry).
Columbian Mammoth White (McInnis).
Palmetto.
Donald's Empire.
Barr's Mammoth.
Conover's Colossal.

The above were all sown on May 4. On account of the extreme dry weather, the germination was weak and growth slow till rains came in July and August, when the plants made some progress.

BEANS.—Sown in the open air on May 8.

Variety.	In use.	Ripe.	Remarks.
Wardwell's Kidney Wax	July 25	Aug. 17	Good cropper.
Burpee's Bush Lima	" 30	" 17	Fair "
Challenge Dwarf Wax	" 20	" 15	Good, very early.
Extra Early Round-Pod Valentine	" 28		Small, did not ripen.
Valentine	" 25	Aug. 20	Good cropper.
Detroit Wax	" 15	" 10	Medium, early.
Black Butter			Runner. Late.
Andalusia Wax	Aug. 20		" "
Early Mohawk	" 10		Good green. Late.
Early Six Weeks	July 28	Aug. 14	"
Black Butter			Runner. Late.
Lima Wax	Aug. 5		Small. Light cropper.
Experimental Farm Seed.			
Giant Dwarf Wax	Aug. 10		Good cropper.
Stringless Wax	" 25		" Late.
Early Six Weeks	July 16	Aug. 10	"
Flageolet Wax	Aug. 10	Sept. 1	Fair cropper.
Dwarf Triumph	" 15		" Good green.
Little Giant Wax	July 10	Sept. 1	Good cropper.
Golden Wax	" 10	" 1	Fair "
Challenge Black Wax	" 20	" 1	Best early.
Rust-proof Golden Wax	" 25		Good early.
Best of All	Aug. 16		Late.
Wardwell's Kidney Wax	July 25	Sept. 1	Good cropper.
Roger's Lima Wax	Aug. 15		Small crop green.
Refugee	" 15		" Late.
Bush Golden Wax	" 15		" "

BEETS.—Sown, April 27. Pulled, September 28.

Variety.	In use.	Bushels per acre.	Remarks.
Egyptian	July 12	1,225	Coarse.
Early Egyptian	" 12	1,225	"
Half-long Blood	Aug. 1	1,028	Good variety.
Early Blood Turnip	" 1	922	"
Early Eclipse	July 12	877	"
Dark Red Triumph	Aug. 12	862	Large.
Eclipse	July 12	710	Good variety.
New Improved Turnip	Aug. 1	700	"
Edmand's	July 12	665	"
Bon Secours Market	Aug. 1	635	Very good.
Dobbie's Selected Globe	July 12	544	"
Dobbie's New Purple	" 12	529	"
Extra Early	" 12	499	"
New Cardinal	" 12	378	Germination weak.
Long Dark Blood	Aug. 1	181	" "
Long Smooth Blood	" 1	90	" "

GARDEN CORN.—Planted, May 15.

Variety.	In use.	Ripe.	Remarks.
Mammoth White Cory	Sept. 5	Sept. 20	Best green.
Early Sugar	" 5	....	Did not mature.
Early Cory	" 5	Sept. 22	Good green.
Early Market	" 5	....	Did not mature.
Adam's Extra Early	Aug. 28	Sept. 22	Good green.
First of All	" 28	" 20	"
Crosby's Early	Sept. 5	" 22	"
Early Minnesota	" 5	....	Did not mature.
Mitchell's Extra Early	Aug. 28	Sept. 22	Good green.
Squaw	" 28	" 20	Early, fair crop.

CABBAGE.

Sown in hot-house, March 27. Transplanted to cold-frame, April 11. Set out, May 14. Taken up October 3.

Variety.	In Use.	Weight.	Remarks.
		Lbs.	
Large Wakefield	Aug. 10	10	Good heads.
All Seasons	" 10	14	"
Mammoth Red Rock	....	9	Fair, solid.
Early Jersey Wakefield	Aug. 14	7	Small, solid.
Early Summer	" 20	9	Fair, split.
Selected Jersey Wakefield	July 25	9	Good heads.
Drumhead Savoy	Sept. 3	20	Large, soft, split.
Mammoth Drumhead	....	17	" solid.
Vandergaw	....	15	" "
Cluster Savoy	Sept. 1	9	Split badly.
First and Best	Aug. 28	7	Good heads.
Succession	" 25	10	"
Henderson's Early Summer	" 18	9	Small percentage good.
Henderson's Succession	" 24	9	Good heads.
Premier	" 24	9	"
Autumn King	....	13	Good, late.
St. Dennis	Sept. 3	10	"
Bruce's Winter	....	13	"
Red Drumhead,	....	10	"
The Lupton	....	20	Good, late, solid.
Marblehead Mammoth	Aug. 11	15	" solid.
Burpee's All Head	" 11	11	" "
New Extra Early Express	July 28	6	" early.
World-Beater	....	13	" late, solid.
All-Head	July 25	10	" early, split.
Improved American Savoy	....	11	Large, soft, split.

CAULIFLOWER.

Sown in hot-house, March 27. Transplanted to cold-frame, April 11. Planted out May 14.

Variety.	In Use.	Weight.	Remarks.
		Lbs.	
Extra Early Paris	June 26	6	Headed well. Good.
Autumn Giant	" 18	6	Large, soft.
Autumn King	Aug. 16	5	Small, solid.
Early Paris	July 14	7	Large, soft.
Veitch's Autumn Giant	Aug. 25	7	Very fine heads.
World's Best	June 26	8	"
Gilt Edge	" 26	10	"
Early Snowball	" 28	7	"

CARROTS.

Sown in open, April 13. Pulled, September 28.

Variety.	In use.	Bushels per Acre.	Remarks.
Danver's Half Long	July 19	438	Small, smooth.
Half Long Stump Rooted	Aug. 1	363	" "
Improved Danvers	" 10	287	Medium "
Half Long Luc	" 10	272	Small "
Half Long Scarlet	" 10	272	" "
Early Scarlet Horn	July 19	272	" rough.
Danver's	Aug. 1	272	" smooth.
Chantenay	" 10	257	" "
Danver's Half Long (Steele)	" 10	211	" "
Scarlet Nantes	" 5	136	" "

CELERY.

Sown in hot-house, March 27. Transplanted to cold-frame, April 26. Transplanted to trench, June 5. Taken up, October 4.

Variety.	In use.	Height.	Weight.	Remarks.
		Feet.	Lbs.	
White Plume	Sept. 1	2	2	Rusty, coarse.
Golden Rose	Oct. 4	1½	2½	"
Turnip Rooted	" 4	1½	4	"
Giant White Pascal	" 4	1½	3½	"
Paris Golden Yellow	Sept. 20	2	3	"
Giant White	Oct. 4	1½	3	"
White Walnut	" 4	2	2½	"
Dwarf White Winter	" 4	2	3	"
New Rose	" 4	1½	2½	"
Golden Heart	4	2	2½	"
White Triumph	" 4	1½	2	"
Rose Ribbed Paris	" 4	1½	3	"

LETTUCE—Sown, April 27.

Variety.	In use.	Remarks.
Early Tennis Ball	June 15	Good.
Extra Early Self Folding	July 1	Extra fine.
Denver Market	June 17	"
New Sensation	" 17	"
Toronto Gem	" 16	"
Ohio Cabbage	" 21	"
Trianon	" 16	"
Big Boston	" 15	Large, good.
Nonpareil	" 17	Good.
Toronto Market	" 25	The best.
Golden Queen	" 20	Good.
Cream Butter	" 20	"
Green Paris Cos	" 25	Very large, good.
Prize Head	" 25	Good.
The Deacon	July 1	"
Gardener's Favorite	" 1	"
New York Market	" 1	"

ONIONS.

Sown in hot-house, March 27 ; transplanted, May 14 ; sown in open, April 13.

Variety.	Yield Transplanted.	Yield Sown in open.	Remarks.
	Bush.	Bush.	
Extra Early Red	317	287	Small ; good.
Large Red Wethersfield	181	136	Large "
Yellow Dutch	90	60	Medium "
Small Silver Skin	66	60	Small "
White Globe	166	136	"
Extra Early Flat Red	212	196	Large.
Red Globe	......	105	Small.
Large Yellow Globe Danver's	212	242	Large ; good.
Prize Taker	212	......	" "
Australian Brown	......	212	Small.
White Portugal	212	136	"
Large Yellow Flat Danver's	181	136	Large ; good.

PEASE—Sown May 8.

Variety.	In use.	Ripe.	Remarks.
Improved Stratagem	July 28	Sept. 17	Large, late.
Premium Gem	Aug. 7	" 1	Medium, early.
Heroine	July 16	" 17	" late.
Alaska	" 10	Aug. 20	Small, early.
Rural New Yorker	" 7	" 20	" "
Best Extra Early	" 7	" 20	" "
Wm. Hurst	" 7	" 1	" "
Daisy	" 24	Sept. 17	Large, late.
First of All	" 7	Aug. 20	Small, early.
Gradus	" 11	Sept. 1	Large "
Prince of Wales	" 16	" 17	Medium, "
Ever-bearing	" 7	Aug. 1	" "

Variety.	In use.	Ripe.	Remarks.
Experimental Farm Seed—			
Stratagem	" 28..	Sept. 17..	Large, late.
Anticipation	Sept. 1..	" 15..	" "
Mott's Excelsior	July 7..	Aug. 20..	Small, early.
American Wonder	" 7..	" 20..	" "
Daisy	" 24..	Sept. 17..	Large, late.
C.P.R	Aug. 16..	" 11..	" "
First and Best	July 7..	Aug. 20..	Small, early.
Shropshire Hero	" 24..	Sept. 11..	Medium, late.
Yorkshire Hero	" 21..	" 11..	" "
Horsford's Market Garden	" 16..	" 15..	Small, early.
Laxton's Charmer	" 28..	" 17..	Large, late.
Burpee's Profusion	" 28..	" 11..	Medium, late.
Duke of Albany	" 14..	" 1..	" early.
Champion of England	" 28..	" 1..	" "
Telephone	" 7..	Aug. 20..	Large "
Heroine	" 16..	Sept. 17..	" late.
Admiral	" 14..	" 1.	Small, early.

SQUASH AND MARROWS.

Sown in hot-house, April 16 ; transplanted, May 14.

Variety.	Ripe.	Weight.	Remarks.
		Lbs.	
White Summer Crook Neck	Aug. 20..	2	Good. Prolific.
Early Yellow Bush Scallop	" 15..	8	" "
Mammoth Whale	" 27..	50	Very large and fine.
Vegetable Marrow	" 10..	6	Good.
English Marrow	" 10..	6	"
New Red Hubbard	" 15..	8	"
Mammoth White	" 27..	5	"
Long Island	" 15..	6	"
Long White Bush	" 20..	8	"

TOMATOES.

Sown in hot-house, March 28 ; transplanted to cold-frame, April 25 ; to garden, May 8.

Variety.	In Fruit.	1st Ripe.	Rough or Smooth.
Early Michigan	June 4....	June 24 ...	Smooth.
Atlantic Prize	" 1....	July 10....	"
Peach	" 25....	Aug. 17....	Rough.
Ponderosa	" 30....	" 20....	Smooth.
Early Ruby	" 2....	July 20....	Rough.
Yellow Plum	" 14....	" 27....	Smooth.
Red Cherry	" 7....	" 31....	"
Imperial	" 4....	Aug. 4....	Rough.
Stone	July 20....	" 14 ..	Smooth.
Earliest of All	June 4 ...	July 20....	Rough.
Dwarf Champion	July 7....	Aug. 31....	"
New Canada	June 30....	" 4....	Smooth.
Imperial	July 10....	" 4....	Rough.
Early Acme	June 25....	" 4....	"
Extra Early Red	" 10 ...	July 25....	Smooth.

PARSNIPS.

Sown April 28 ; lifted September 28.
Matchless.—166 bushels per acre. Very inferior.
Magnum Bonum.—150 bushels per acre. Very inferior.

PEPPERS.

Sown March 29 ; transplanted May 25.
Large Bell.—Good green, did not mature.
Japanses Cluster.—Good green, did not mature.

PUMPKINS.

Sown April 16 ; transplanted May 14.
Winter Luxury.—Ripe August 24 ; weight 7 pounds.
Connecticut Field.—Ripe August 24 ; weight 15 pounds.

HERBS.

Sown May 6.
Sage.—Good crop.
Summer Savory.—Good crop.
Cress.—Good crop.

SPINACH.

Sown May 6 ; produced a fair crop.

COFFEE-BERRY.

Sown May 29 ; ripe August 20 ; good crop.

CITRONS.

Sown April 9 ; set out May 14.
Colorado Preserving, Colorado, Red Seeded ; produced a poor crop of very small fruit.

TURNIPS.

Sown May 15; taken up September 28.
Golden Ball.—559 bushels per acre.
Early Snowball.—453 bushels per acre.

TOBACCO.

Sown March 29; transplanted May 25; in flower July 25; taken up September 11.
General Grant.—4 feet ; good crop.
Connecticut Seed Leaf.—4 feet ; good crop.

RHUBARB.

Victoria.—In use May 23 ; poor crop.
Linnæus.—In use May 23 ; poor crop.
Large Green.—In use May 23 ; poor crop.

New Seeding.

Sown April 26 ; transplanted June 18.

CUCUMBERS.

Sown in hot-house, April 9 ; re-potted, April 20 ; planted out, May 12.

Improved Long Green, Emerald, White Wonder, Albino, Short Green Gerkin, Prize Pickling, Giant Pera, English Favourite, Extra Early White Spine, White Pearl, Early Cluster, Early Frame, High Grade White Spine, Market Garden, Japanese Climbing, Improved White Spine, Early Siberian, Cool and Crisp, Chicago Pickling.

On account of dry weather all except Emerald were a complete failure. Emerald in use July 25.

RADISH.

Sown April 27.

Black Spanish, First Crop, White Olive, Rosy Gem, Earliest Carmine, Scarlet Olive (Bruce), New Crimson, White Olive (Steele), Scarlet Olive (Steele), White Tipped, Non Plus Ultra.

On account of dry weather the germination was very weak and the crop almost a failure.

KALE.

Sown in hot-house, March 27; transplanted, April 11; set out, May 14.

Grew very large and fine, but on account of drought in early part of season was late.

MUSK MELONS.

Sown April 9 ; transplanted May 14.

Exquisite, Earliest of All, Tip Top, The Banquet, Extra Early Netted Gem, Dominion Green Fleshed.

A very small crop of fruit set, which did not ripen.

WATER MELONS.

Sown April 9 ; transplanted May 14.

Cole's Early, McIvor's, Vick's Extra Early, Early Canada, Dixie, Black Spanish, Sugar.

No fruit set.

FLOWER GARDEN.

Late in the season flowers of all kinds made a good display, but until the rains came in July nothing did well.

Stocks, Verbenas, Asters, Candytuft, Zinnias and Petunias were very fine.

Perennials did not do as well as usual on account of the dry weather early in the season.

ANNUALS—Propagated in Hot-house.

Variety.	Sown.	Transplanted to Garden.	In Bloom.	Remarks.
Antirrhinum major	Mar. 28	May 25	July 26	Did not do well.
Abronia umbellata	" 29	" 25	" 15	" "
Amranthus rubra	" 29	" 25	June 5	Very fine show.
Arabis nana compacta	" 29	" 25	....	Did not flower.
ASTERS.				
Truffaut's Pæony Flowered	Mar. 26	May 25	July 15	Came in bloom very early on account of dry weather and were very inferior, but when rains came the second growth made a fine continuation of bloom, lasting till Sept. 15.
Pyramidal " "	" 26	" 25	" 15	
Globe " "	" 26	" 25	" 15	
Betteridge's Prize	" 26	" 25	" 20	
Quilled	" 26	" 25	" 20	
Imbricated Pompone	" 26	" 25	" 20	
Pæony-flowered Globe	" 26	" 25	" 20	
Balsam	" 26	" 23	June 10	Very fine.
Brachycome	" 28	" 23	July 10	"
Bachelor's Button	" 29	" 25	" 6	Did not do well.
Calliopsis, 2 varieties	" 27	" 22	June 16	Very fine.
Candytuft	" 27	" 25	" 12	Did well.
Coreopsis lanceolata	" 27	" 25	" 25	Flowered well.
Chrysanthemum, 5 varieties	" 27	" 23	" 28	A good display of bloom.
Convolvulus major	" 28	" 25	July 1	The few plants which grew were very fine.
Dianthus, 11 varieties	" 27	" 21	June 20	Did fairly well.
Dahlia	" 28	" 21	....	Did not flower.
Zinnia, 2 varieties	" 28	" 25	June 5	Bloomed freely.
Everlastings, 2 varieties	" 28	" 21	July 8	Did well. Color fine.
Gladiolus	" 28	" 25	Aug. 1	Too late.
Gaillardia, 3 varieties	" 27	" 25	July 4	Did well.
Lobelia, 2 varieties	" 27	June 22	" 21	"
Marigold, French, 2 varieties	" 27	May 21	June 6	Very fine display.
Petunia, 5 varieties	" 26	" 21	" 12	Bloom very large and fine, but few plants were double.
NASTURTIUM.				
Tom Thumb	April 10	May 2	June 16	Very fine; foliage large and dark; flowers large and abundant.
Dark Purple	" 10	" 2	" 16	
La Beaute	" 10	" 2	" 16	
Dark Scarlet	" 10	" 2	" 16	
Mixed	" 10	" 2	" 16	
Phlox Drummondii, 12 varieties	Mar. 26	" 21	" 12	Early flowers were very inferior, but second growth made fine show.
Portulaca, 2 varieties	" 27	April 16	" 12	Very fine.
Pyrethrum	" 29	May 21	July 20	Did fairly well.
Salpiglossis, 3 varieties	" 28	April 16	Aug. 10	Very few plants grew.
Stocks, 34 colours	" 26	May 21	June 10	First flowers small and inferior; bloom on second growth very fine, lasting till Sept. 1.
Sunflowers, 2 varieties	April 25	June 15	July 27	Very fine.
Verbenas, 2 varieties	Mar. 26	May 21	June 12	First flowers very inferior; second growth did well and produced good show, lasting till Sept. 15.
Ice Plant	" 28	" 25	...	Growth very strong: foliage fine.

ANNUALS—SOWN IN OPEN.

Variety.	Sown.	In bloom.	Remarks.
Dianthus	May 5	Sept. 1	Too late.
Eschscholtzia	" 5	July 6	Very fine.
Godetia, 2 varieties	" 5	Aug. 10	Did not do well.
Mignonette	" 5	July 10	Very inferior on account of dry weather.
Poppy, 5 varieties	" 5	" 24	Very fine display.
Sweet Pease, 3 varieties	" 5	" 28	On account of dry weather, almost a total failure, growth weak.

PERENNIALS.

Variety.	Sown.	Trans-planted.	In bloom.	Remarks.
Hollyhock. 5 plants		May 15.	July 10.	Did well. Colour very dark. Bloom large and abundant.
Linum	Mar. 28.	" 15.	" 16.	Did not do well.
Pansies :—				
Cassier's Large-flowered	" 27.	June 15.	" 20.	The pansies sown March 27, did not do well, but late in season the old bed made a fine show.
Prize Trimardeau	" 27	" 15.	" 20.	
Peacock	" 27	" 15.	" 20.	
Lorenz's Perfection	" 27.	" 15.	" 20.	
Exhibition prize	" 27.	" 15.	" 20.	Flowers large : colour and marking very fine.
Sweet William			June 10.	Old bed bloomed early and second growth made fine succession.
Everlasting Pea			July 15.	Made strong growth aad flowered freely.
Rudbeckia, Golden-glow			Aug. 15.	Didnot do as well as usual, on account of drought.

BULBS.

(Planted 1898-1899.)

Tulips.

On account of dry weather the flowering was irregular and the display not as fine as usual. There were, however, some very fine individual flowers. In bloom April 27.

Scilla sibirica.

In bloom April 20. Did fairly well.

Gladioli.

In bloom August 1. Some very fine specimens although many plants failed to flower.

Iris.

On account of dry weather the Iris made very unsatisfactory growth and very few blossomed until late in the season. A few plants came into bloom on June 8, but did not last long, and flowers were inferior.

PERENNIAL PHLOX.

The following varieties of Phlox were received from the central farm and planted in May, 1900 :—

Phlox decussata Figaro.
" " Amphion.
" " Etoile de Lyon.
" " Adonis.
" " Adam Brown.
" " A. Modsen.
" " Commissaire Gallet.
" " Lucile Baltet.
" " Clio.
" " *rubra splendens.*
" " Mad. Trotter.
" " Lucy Russell.
Phlox decussata Mons. Thuret.
" " Martha.
" " Jeanne d'Arc.
" " Sorpillum.
" " New Dwarf White.
" " Pantheon.
" *amœna.*
" *divaricata.*
" *reptans.*
" *pilosa.*
" *subulata lilacina.*

PAEONIES.

The following named varieties are under trial and promise well. They were received from the Central Farm early in May, 1900 :—

Pœonia sinensis Faust.
" " Arthur.
" " Oliver.
" " Thorbecki.
" " Auguste de Hour.
" " Souvenir de l'Exp. Universelle.
" " Caroline Alain.
" " Mons. de Villeneuve.
" " *Lilacina Superba.*
" " *Albiflora Thorbecki.*
" " *Officinalis Mutabilis.*
" " Professor Morren.
" " *Festiva Maxima.*
" " De Candolle.
" " Rose of Gentbrugge.
" " *Tri-color Grandiflora.*
" " *Mutabilis.*
Pœonia sinensis Heckla.
" " *Rubicunda alba Marg.*
" " *Rubra plenissima.*
" " *Festiva.*
" " *Pulcherrima.*
" " Duchesse d'Orleans.
" " *alba-plena.*
" " Auguste Mueller.
" " Ambroise Verschaffelt.
" " Bruante Françoise.
" " *atro-rubens.*
" " Prosper d'Aurenberg.
" " L'Eclatante.
" " Faubert.
" " Prince de Salm Dyck.
" *tenuifolia fl. pl.*

IRIS.

The following varieties of Iris have been received from the Central Farm and are making fair growth :—

Iris amœna Crebillon.
" " Mrs. H. Darwin.
" " Julia Grisi.
" " Maria Theresa.
" " Victor Lemoine.
" *aurea.*
" *Balkana.*
" *biflora.*
" *biglumis.*
" *Blondovi.*
" *cristata.*
" *chamœiris.*
" *ensata.*
" *flavescens.*
" *florentina.*
" *furcata.*
" *Germanica.*
" " Asiatica.
" " Verschuur.
" *gigantea.*
" *goldenstadtiana cœrulescens.*
" *Hungarica.*
" *neglecta* Agathe.
" " Arlequin Milanais.
" " *Hericartiana.*
" " Sappho.
" *nudicaulis.*
" *orientalis.*
" *oxypetala.*
" *pallida.*
" " *cengialti.*
" *plicata* Gisela.
" " Lord Seymour.
" " Reine des Belges.
Iris plicata Swertii.
" *prismatica.*
" *pumila.*
" " *cinerea.*
" " *gracilis.*
" " *lutea.*
" *ruthenica.*
" *sibirica.*
" " *alba.*
" " *hœmatophylla.*
" " *violacea.*
" *squalens.*
" " Bronze Stoffels.
" " Dina.
" " Haydee.
" " Hector.
" " La Marmora.
" " La Tristesse.
" " Minerva.
" " Tarquin.
" *variegata.*
" " *Arguinto.*
" " Coquette.
" " Darius.
" " Gracchus.
" " Henry Havard.
" " Honorabile.
" " Innocenza.
" " Minos.
" " Munico.
" " *pancrace.*
" " Samson.
" " Souvenir.
" *virescens.*

SPIRAEA.

The following varieties of herbaceous spiraeas have been received from the Central Farm and are doing well :—

Spiræa aruncus.
" *digitata glabra.*
" *filipendula.*
" " *fl. pl.*
" *kamschatica.*
" *palmata.*
Spiræa palmata elegans.
" *pubescens.*
" *ulmaria.*
" " *fl. pl.*
" *venusta.*
" " *pallida.*

SUNDRY PERENNIALS.

Increasing interest is felt from year to year in hardy perennial plants. In the following list are many old favourits and a number of newer sorts hitherto untried here. A large proportion of these were sent to Indian Head for test from the Central Farm this year. Most of them are now fairly well established, and if they prove hardy in this climate may be expected to bloom next year.

Anthemis tinctoria Kelwayi.
Achillea millefolium rubrum.
" Sibirica Blush.
" Sibirica white.
" *Ptarmica fl. pl.*
Acorus spurius.
Asarum Canadense.
Ajuga reptans atropurpurea.
" *Genevensis.*
Acthionema coridifolium.
Aster Novae Angliae roseus.
" " Newry seedling.
" " Top Sawyer.
" " W. Bowman.
" " White Queen.
Asclepias tuberosa.
Aconitum pyrenaicum.
" *Kuzmalowii.*
Anemone Narcissiflora.
Artemisia stellerianum.
Boltonia latisquama.
" *asteroides.*
Cotoneaster verticillata.
Chelone Lyoni.
" *barbata.*
Clematis recta.
Coreopsis delphinifolia.
Centaurea montana alba.
" *macrocephala.*
Campanula turbinata.
" *Rainerii.*
" *Glomerata Dahurica.*
" *Americana.*
" *Asiatica.*
" *persicæfolia grandiflora.*
Doronicum Clusii.
" *Caucasicum.*
" *plantagineum excelsum.*
Erigeron macranthus.
Epimedium muschcanum rubrum.
" *rubrum.*
Funkia univittata.
" *lancifolia.*
" *Sieboldiana.*
Geranium maculatum.
Geranium Wilfordi.
" *sanguineum.*
" *platypetalum.*
Geum triflorum.
Helenium grande striatum.
Heuchera sanginca.
Hemerocallis Dumorticri.
" *fulva.*
" *Kwanso fl. pl.*
" *variegata fl. pl.*
" *Middendorfii.*
" *disticha fl. pl.*
" *graminifolia.*
Helianthus Maximiliana.
" *giganteus.*
" *autumnale.*
Lupinus polyphyllus.
Lilium superbum.
Lysimachia nummularifolia.
" *punctata.*
" *clethroides.*
Monarda didyma.
Poterium officinale.
Pyrethrum uliginosum.
Phlomis fruticosum.
Potentilla hybrida versicolor.
Phalaris arundinacea fol. var.
Physostegia Virginica alba.
Rudbeckia laciniata.
Sempervivum Montanum.
" *Boulicianum.*
Symphytum asperrimum.
Sidalcea candida.
Senecio alba balsamitae.
Solidago Missouriensis.
" *gigantea.*
" *rigida.*
Thermopsis fabacea.
" *Caroliniana.*
Tradescantia Virginica alba.
" *Virginica coerulea.*
Valeriana officinalis.
Veronica spicata.
" *Virginica.*
" *elegans carnea.*

CANNAS.

Dry weather injured the plants and not many of them flowered. A few, however, produced some very good blooms. The following varieties are under test :—

Austria.
Allemania.
Aphrodite.
Asia.
Burbank.
Baron de Poilly.
C. Bernardin.
Comte de Bouchard.
Explorateur Campbell.
Florence Vaughan

Furst Bismark.
Graf Oswald de Kerchove.
Hortense Barbereau.
J. D. Eisle.
Madagascar.
M. Crozy.
Paul Lorenz.
President Cleveland.
Roi des Rouges.

DAHLIAS.

These were in bloom July 1, but dry weather injured the plants and spoiled the bloom. A second growth made after the rains came was just coming into bloom when the plants were frozen September 13. The following varieties were tested :—

Bird of Passage.
Cochineal.
Chairman.
Crimson Beauty.
Cactus Queen.
Constance.
Clifford W. Bruton.
Fairy Queen.
Gem.
Hector.
Herbert Turner.
Herbert.
John Sladden.
Lyndhurst.
Lady Antrobus.
Liliputian.
Little Pigmy.
Mantas la Villa.
Mrs. Peart.
Mrs. Langtry.
Nemesis.
Perfect Vallose.
Sambo.
Snow-clad.
Victory.
Woman-in-white.
Wm. Agnew.

TREES AND SHRUBS.

On the whole, trees and shrubs made satisfactory progress during the past season.

An unusually early start was made in the spring, and the chance for a large growth was a good one. In June, however, dry weather and terribly hot winds checked the progress and threatened to cause serious loss, but the heavy rains in the early part of July effected a wonderful change and before the end of the season about one-half the usual growth had been attained.

Frost in September caught everything in full leaf, with wood far from matured and in bad condition to stand a hard winter.

The winter of 1899 was very favourable for trees and shrubs, and all well established varieties came through safely.

NEW PLANTATIONS.

In May about one-third of a mile on the east side of the farm was planted with Box-elder (*Acer Negundo*) for a hedge. Hardly a single tree stood the dry weather following, and the whole row will have to be re-planted.

FOREST PLANTATION.

The Box-elder (*Acer Negundo*), Elm (*Ulmus Americana*), Ash (*Fraxinus Viridis*), and Sand-cherry, in forest plantation, described in last report, made satisfactory progress. The trees are now shading the ground, and in future very little work will be required to keep down the weeds.

ARBORETUM.

The arboretum now contains 358 species and varieties of trees and shrubs, which have been planted as follows :—

In 1895, 41 varieties ; in 1896, 62 varieties, of which 6 replaced deaths in 1895 ; in 1897, 75 varieties, of which 2 replaced deaths in 1896 ; in 1898, 62 varieties, of which 5 replaced deaths of 1897 ; in 1899, 163 varieties, of which 22 replaced deaths of 1898 ; in 1900, 37 varieties, all of which replaced deaths of 1899.

HEDGES.

The hedges around the fruit plantations and vegetable gardens were somewhat injured by the dry weather and hot winds in June, but had quite recovered by the end of the season. The leaves remained on till frozen about the middle of September.

SAMPLE HEDGES.

All the sample hedges did well this year, and the plantation was a source of much interest to visitors.

ROSES.

The rose bushes, planted in 1899, did not make much progress. A few bushes flowered early in the season, but all were affected by dry weather, and it is feared that the second growth, which was made after the rains commenced in July, will suffer during the coming winter.

FRUIT TREES AND BUSHES.

In no year since the farm started have the small fruits promised so well and resulted in such an entire failure, as in the season just passed.

Currants of all sorts, gooseberries, raspberries and strawberries came through the winter perfectly, and starting early, with no spring frost to injure them, made a fine showing. A hot wind, however, caught the gooseberries and strawberries in blossom and completely destroyed all chance of a crop. Currants and raspberries. at this time, were further advanced and escaped injury, only to have their immense crops of fruit completely cooked by the excessively hot winds of June 21, 22 and 23. A small quantity of fruit on the under side of the bushes escaped, but was of little use, as it was too badly dried up to be worth picking.

SEEDLING APPLES.

Two seedlings of Arctic and Tonka, planted in 1899, did not winter-kill, and made fair growth during the season.

This spring six trees of Hibernal, six trees of Blushed Calville and six trees of Wealthy were planted in a well sheltered inclosure.

CRAB APPLES *(Pyrus baccata)*.

The trees planted in 1896, in one of the inclosures, came through the winter in excellent condition, and made fair growth during the season. No winter-killing took place, and growth commenced early in April. From May 5 to 10, seven trees that bore fruit last season came in blossom, and thirty blossomed for the first time. The fruit ripened from August 20 to September 1, and in every case was the finest so far produced on the farm.

As the condition of the plantation is practically the same as last year, it is not considered necessary to report on the growth and hardiness of the different varieties. The following notes on their fruiting is submitted :—

Received from Central Experimental Farm, Ottawa.—Planted 1896.

Pyrus baccata macrocarpa—

Tree No. 1.—Bloom, May 5. Ripe, August 25. Light crop. Size of choke-cherry. Red.

Tree No. 2.—Bloom, May 5. Ripe, August 20. Heavy crop. Size of choke-cherry. Red. Very astringent.

Pyrus baccata cerasiformis—

Tree No. 1.—Bloom, May 5. Ripe, August 25. Light crop, very small, red fruit, very astringent.

Tree No. 2.—Bloom, May 5. Ripe, August 25. Heavy crop, small, red, astringent fruit.

Tree No. 3.—Bloom, May 10. Ripe, September 1. Light crop, small, red, astringent fruit.

Pyrus baccata genuina—

Tree No. 1.—Bloom, May 5. Ripe, August 25. Light crop, small, red, astringent fruit.

Tree No. 2.—Bloom, May 10. Ripe, September 1. Light crop, small, red and yellow, astringent fruit.

Tree No. 3.—Bloom, May 5. Ripe, September 1. Heavy crop, size of *baccata*, pale red. Astringent.

Tree No. 4.—Bloom, May 5. Ripe, September 5. Light crop, small, yellow, good flavour.

Tree No. 5.—Bloom, May 5. Ripe, August 25. Good crop, large, flat, yellow, cheek. Good flavour. The largest grown this year.

SEEDLINGS RAISED AT INDIAN HEAD.

(Planted 1896.)

Pyrus baccata genuina—

Tree No. 1.—Bloom, May 5. Ripe, September 1. Light crop, small, red, slightly astringent fruit.

Tree No. 2.—Bloom, May 5. Ripe, September 1. Very light crop, small, red, astringent fruit.

Pyrus baccata cerasiformis—

Tree No. 1.—Bloom, May 5. Ripe, August 20. Good crop, large, red and yellow fruit. Excellent flavour. One of the best.

Tree No. 2.—Bloom, May 5. Ripe, September 1. Light crop, small red, astringent.

Tree No. 3.—Bloom, May 10. Ripe, September 1. Light crop, size of choke-cherry, red. Slightly astringent.

Tree No. 4.—Bloom May 10. Ripe September 1. Light crop, small, astringent fruit.

Tree No. 5.—Bloom May 10. Ripe September 1. Good crop, small astringent fruit.

Tree No. 6.—Bloom May 10. Ripe September 1. Good crop, size of cherry, yellow and red. Good flavour.

Tree No. 7.—Bloom May 5. Ripe September 1. Light crop, size of cherry, sour.

Pyrus baccata macrocarpa—

Tree No. 1.—Bloom May 5. Ripe August 20. Good crop, size of choke-cherry, yellow and red. Good flavour.

Tree No. 2.—Bloom May 10. Ripe August 25. Fair crop, size of cherry, yellow and red. Very sour.

Tree No. 3.—Bloom May 5. Ripe August 25. Good crop, size of small cherry, red, good flavour.

Tree No. 4.—Bloom May 5. Ripe September 1. Good crop, size of small cherry, red, good flavour.

Pyrus baccata macrocarpa—Con.

Tree No. 5.—Bloom May 5. Ripe September 1. Light crop, size of choke-cherry, red, very astringent.
Tree No. 6.—Bloom May 5. Ripe August 25. Light crop, larger and flatter than *baccata*. Yellow, red cheek, good flavour.
Tree No. 7.—Bloom May 10. Ripe September 1. Light crop, large, flat yellow, good.

Pyrus prunifolia—

Tree No. 1.—Bloom May 5. Ripe August 20. Light crop, small fruit.
Tree No. 2.—Bloom May 5. Ripe August 20. Light crop, small, red, good flavour.
Tree No. 3.—Bloom May 10. Ripe September 1. Light crop, size of large cherry, flat, yellow and red, good flavour.
Tree No. 4.—Bloom May 10. Ripe September 1. Light crop, small, red.
Tree No. 5.—Bloom May 10. Ripe August 25. Very heavy crop, size of *baccata*, bright red, very astringent.
Tree No. 6.—Bloom May 5. Ripe August 25 . Light crop, small, pale red.

Pyrus baccata sanguinea—

Tree No. 1.—Bloom May 5. Ripe August 20. Light crop, very small, red.
Tree No. 2.—Bloom May 5. Ripe August 20. Light crop,, small, yellow.
Tree No. 3.—Bloom May 10. Ripe September 1. Light crop, small, red.
Tree No. 4.—Bloom May 5. Ripe August 25. Very heavy crop, size of small cherry, red, good flavour.

From the above notes it will be seen that these wild forms of Siberian crab do not reproduce themselves from seed truly, but vary very much in the size and quality of their fruit. Their hardiness in the North-west is now fully established, and from their improvement by selection and top grafting of the poorer sorts with the better kinds, some useful fruits will no doubt be obtained. The prospects are still brighter for future apple production here from the new cross-bred sorts produced at Ottawa, which are much larger, and as far as they have been tested most of them seem to be hardy.

HYBRID CRABS.

(Planted 1898-99.)

The surviving root-grafts and cross-bred seedlings which have been growing in plum and pyrus orchard west of the superintendent's house since 1898-99 were this spring removed to an inclosure near the Arboretum and set out with hybrid crabs received from the Central Experimental Farm.

The number of each variety is as follows :—

Root-grafts.

No. 165, 2 trees ; No. 16, 1 tree ; No. 30, 1 tree ; No. 107, 1 tree ; No. 122, 3 trees ; No. 164, 2 trees ; No. 79, 1 tree ; No. 162, 1 tree ; No. 19, 1 tree ; No. 53, 1 tree ; No. 142, 1 tree ; No. 125, 1 tree ; No. 163, 1 tree ; No. 64, 1 tree ; No. 161, 1 tree.

Cross-bred Seedlings.

No. 96, 6 trees ; No. 95, 6 trees ; No. 51, 1 tree.

Very little progress was made during the growing season and several of the varieties succumbed during the hot weather of June and July.

HYBRID CRABS.

(Planted 1900.)

On April 27 six each of five of the most promising varieties of hybrid crabs, recently produced at the Central Experimental Farm, Ottawa, and which are expected to prove hardy in the North-west, were received and planted in a well sheltered. inclosure.

The ground for about a foot on each side of the graft was at once mulched with 2 inches of well-rotted manure to keep the earth moist. They have made fairly good progress considering the unfavourable character of the season.

PLUMS.

Seedlings of Hungarian—Planted, 1894.—Winter-killed considerably and did not make much progress this season. Did not blossom. A second growth was made in July and August, which has not thoroughly matured, and it is feared that these and other plums will suffer during the coming winter.

Seedling of Speer—Planted, 1895.—Slightly winter-killed. Made fair growth. Did not blossom.

Seedling of De Soto—Planted, 1895.—Living at tips, spring, 1900. Fair growth during the season. Did not blossom.

Seedlings of Voronesh—Planted, 1895.—Killed at tips. Fair growth. Did not blossom.

Seedlings of Imperial Blue—Planted, 1895.—Winter-killed at tips. Strong growth. Did not blossom.

Seedlings of Weaver—Planted, 1894.—Nearly all of the trees in this plantation came through the winter in good condition, less than one-third showing any signs of winter-killing. Twenty-nine trees blossomed, of which 25 bore fruit. In blossom May 12. Ripe from August 25 to September 5. Five of the trees produced an excellent quality of fruit and four trees of the five bore a very heavy crop. The fruit ripened evenly and when preserved was of good flavour and texture.

PLUMS FROM C. E. FARM, OTTAWA.

Aikin Plum—Planted, 1897.—Came through the winter in good condition and blossomed freely on May 12. A large crop of fruit set and ripened. The plums were the largest grown on the farm this year, and were of excellent quality and flavour ; colour, deep red, skin thin, ripe August 25. Since this plum was planted in 1897, it has made steady progress and now promises to be a valuable variety for the North-west. The tree which fruited was planted in one of the hedge inclosures, where it was well sheltered.

PLUMS RECEIVED FROM CHARLES LUEDLOFF, COLOGNE, MINN., U.S.A.

Planted, 1896.—Of the 38 varieties of American plum seedlings living last fall, all came through the winter, although a number of the varieties were more or less killed back.

Cottrell, Weaver, Van Deman, Peffer's Premium, Wood, and Ocheeda, blossomed in May, but no fruit set.

City—Blossomed May 10.—Fair crop. Large fruit, good quality. Ripe, September 1.

Large Red sweet—Blossomed, May 10.—Light crop. Large fruit, fair quality, late. Ripe, September 15.

Dunlap, No. 1—Blossomed, May 15.—Fair crop. Medium sized fruit. Did not ripen.

New Ulm—Blossomed May 5.—Light crop. Very large and fine fruit of excellent flavour. Ripe, September 10. This variety has been fairly hardy and is likely to prove a useful plum for cultivation in the North-west.

Purple Yosemite—Blossomed, May 20.—Light crop. Medium sized fruit. Did not ripen.

MANITOBA NATIVE PLUMS—FROM THOS. FRANKLAND, STONEWALL, MAN.

Of the 35 numbered varieties reported living last fall, two died during the winter, and the others, with the exception of 18 varieties, were more or less killed back.

FRUITING.

Number.	Name of Variety.	Crop.	Size.	Colour.	Flavour.	Ripe.
60	Yellow Sweet	Heavy	Large	Yellow	Medium	Sept. 1.
7	Saskatchewan	"	Medium	Red	Excellent	Aug. 20.
51	Arctic	Light	Large			Late.
69	Pasqua	"	"			"
89	Laurie	Fair	Small	Red		"
67	Eva	Heavy	"	"	Excellent	Sept. 10.

Seedlings Raised at Indian Head—Transplanted, Spring, 1895.—Came through the winter in good condition, and blossomed May 10 to 20.

Following are notes on their fruiting :—

Name.	Crop.	Size.	Colour.	Flavour.	Skin.	Ripe.
Chinook	Heavy	Medium	Red			Aug. 25
Allie	"	"	"	Good	Thin	" 25
Bedford	Light	"				
Prairie Rose	Heavy	"	Red	Good	Thick	Aug. 25
Dawson City	Fair	"				
First Sweet	Heavy	"	Red	Excellent	Thin	" 20
Regina	"	Small	"	Good	Thick	" 20
Souris	"	Medium	"	Fair	"	" 20
Ruby	"	Small	"	Sour	"	" 30
Charmer	Light	Large	"	Bitter		" 20
Victor	"	Medium				" 25
La Rouge	Heavy	"	Red	Good	Thick	" 25
Yellow Sweet	"	Large	Yellow	Fair	Thin	Sept. 1
Yukon	"	Medium	Red	Good	Thick	Aug. 25
Alberta	Fair	Large				" 25
Assiniboia	Small	Medium				" 25
Fin de Siècle	Heavy	Large	Red	Fair	Thick	" 25

CHERRIES.

Seedling of Carnation.—Planted 1894.—Winter-killed one-half. Fair growth during season.

Seedling of Lithaur Weichsel—Planted 1894.—Came through the winter in fairly good condition. One tree blossomed but did not bear fruit.

Mahaleb—Planted 1895.—Killed one-half. Made good growth this season.

Seedling of Olivet—Planted 1895.—Winter killed back one-half. Made fair growth during season.

Seedlings of Minnesota Ostheim—Planted 1895.—Considerably winter-killed, and on account of dry weather early in the season did not make satisfactory growth.

Seedlings of Wild Cherry from Nebraska, U.S.A.—Planted 1896.—Winter-killed at tips. Made slow progress during season and did not fruit.

Rocky Mountain Cherry—Planted 1895.—Hardy. Fruiting lightly. Fruit small on account of dry weather.

Prunus Pumila—Hardy. Fruiting lightly, and on account of dry weather the fruit was small and dried up.

APRICOTS.

Two trees from Turkestan. Winter-killed at tips. Fair growth during season.

SMALL FRUITS.

The extremely hot weather just at the time the small fruits were beginning to mature almost completely destroyed the crop, and in consequence it is not considered necessary to report on the fruiting of each variety.

WHITE CURRANTS.

White Grape, White Dutch, White Transparent and White Imperial. Hardy. Fair growth during the season.

RED CURRANTS.

Fay's Prolific, Raby Castle, Red Dutch, La Conde, Knight's Early Red, New Red Dutch, Native Red, London Red, Victoria, Fertile d'Angers, Cherry, Prince Albert, La Fertile, Versaillaise, North Star, Pomona and Wilder. Came through the winter in good condition. Large crop fruit set. Dried up. Growth fair.

BLACK CURRANTS.

Lee's Prolific, Black Naples, Prince of Wales, Crandall. Saunders' Seedlings : Stewart, Clipper, Orton. Kerry, Eagle, Monarch, Charmer, Beauty, Winona, Ontario, Standard, Lewis, Ethel, Stirling, Star, Madoc, Perry, Eclipse, Oxford, Climax, wintered in good condition. A very heavy crop of fruit set, but was destroyed by heat. The bushes made a strong growth late in the season.

RASPBERRIES.

Dr. Reider, Philadelphia, Turner, Caroline, Lady Anne, Garfield, Miller's Red and Kenyon, wintered in excellent condition and set a large crop of fruit, which was completely destroyed by heat.

BLACK-CAP RASPBERRIES.

Wintered well. A large crop of fruit set, but was destroyed by heat.

GOOSEBERRIES.

Smith's Improved, Lancashire Lad, Governess, Columbus, Houghton, Native, Pearl and Keepsake. Heavy crop of fruit set, but they ripened prematurely and were of no value.

STRAWBERRIES.

Capt. Jack, New Dominion, Windsor Chief and Pine-apple wintered fairly well, but the crop was very light.

Planted 1900.—Twelve each of St. Joseph and Jean d'Arc (everblooming).

CATTLE.

The herd on the farm at present consists of:—One pure bred Shorthorn bull and eleven females ; one pure bred Ayrshire bull ; one pure bred Guernsey bull ; four grade Ayrshires ; two grade Holsteins ; one grade Polled Angus, and eleven grade Durhams; in addition to which, sixteen grade steers have been purchased for use in a dehorning test, to be carried on during the winter.

Since last report the 3-year old Holstein bull 'Earl of Edgeley 2nd' has been sold, the yearling Durham 'General Kitchener' sent to the experimental farm at Agassiz, British Columbia, and the yearling Durham 'Lord Roberts' sold for breeding purposes.

TEST OF DEHORNING STEERS.

During the winter of 1899 and 1900, fifteen 3-year old grade steers were obtained from Messrs. Gordon & Ironside, of Winnipeg, Man., for use in a test of the practicability of dehorning.

On November 29, after a preparatory feeding of twenty days, a 16-weeks test was commenced to determine :—1st. What loss, if any, is occasioned by the process of dehorning, and 2nd. If feeding loose in a box stall, rendered possible by dehorning, has any advantage over stall-feeding.

On the above date, the fifteen animals were divided into three lots of approximately equal weight :—

Lot No. 1.—Five steers, left in a natural state and tied up.
Lot No. 2.—Five steers, dehorned (by sawing off horns with a small hand-saw) and tied up, and
Lot No. 3.—Five steers, dehorned (by the same method as above) and put in a loose box.

The three lots received a uniform ration throughout the test, which consisted of :—

During first four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Meal	6

During second four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Meal	6

During third four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Hay	8
Meal	6

During fourth four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Hay	10
Meal	10

The hay and straw were cut, and the meal consisted of two parts of ground barley to one part of ground wheat. The steers were fed three times daily, and watered once.

From four to six days after dehorning, no effect of the operation was noticeable on the animals. but after that time they all went off their feed, were dull and apparently very sick, which condition lasted for about one week. In most cases the recovery was rapid ; one animal, however, became very sick, and did not entirely get over the operation for about three weeks.

When the test was concluded, the animals were left where they were, and fed a heavier ration till May 9, when they were delivered to Messrs. Gordon & Ironside, who paid 8 cents per pound for the increase in weight.

Following will be found a statement of the monthly and total weights and gains of each lot of steers during the period of the test ; weights and gains made by the bunch during the whole period (November 10 to May 9) ; the total amount and estimated value of feed consumed during the same time, and a summary of the financial results of the transaction :—

MONTHLY and total Weights and Gains of each lot of Steers, during period of Test.

Lot.	Weight at start of Test.	1st 4 WEEKS.		2nd 4 WEEKS.		3rd 4 WEEKS.		4th 4 WEEKS.		Total Gain.
		Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Number 1. ...	6,220	6,330	110	6,900	270	7,170	270	7,290	120	770
" 2....	6,250	6,390	140	6,750	360	6,990	240	7,160	170	910
" 3. ..	6,385	6,710	325	6,860	150	7,120	260	7,280	160	895

WEIGHTS and gains made by the bunch, during the whole period. November 10, May 9.

Lot	Weight when taken from exporter, November 10.	Weight when lifted by Exporter, May 9.	Gain.
	Lbs.	Lbs.	Lbs.
Number 1....	6,580	7,750	1,170
" 2....	6,525	7,930	1,405
" 3....	6,565	7,740	1,175
Total....	19,670	23,420	3,750

TOTAL weight and estimated value of feed consumed during the whole period.
During the preparatory feeding. Each lot (5 steers) 20 days—

Ensilage, 16 lbs. per day, 1,600 lbs. at $2..	$1 60
Straw, 15 lbs. per day, 1,500 lbs. at $1....	0 75
Meal, 4 lbs. per day, 40 lbs. at ⅔ cent....	2 66
	$5 01

Or for three lots, $15.03.

During test (112 days), each lot—

Ensilage, 8,960 lbs. at $2	$8 96
Straw, 8,400 lbs. at $1	4 20
Hay, 2,550 lbs. at $5	6 37
Meal, 3,920 lbs. at $\frac{2}{3}$ cents	26 13
	$45 66

Or for three lots, $136.98.

From end of test till lifted by exporter (43 days), each lot—

Ensilage, 16 lbs. per day, 3,440 lbs. at $2	$3 44
Straw, 10 lbs. per day, 2,150 lbs. at $1	1 07
Hay, 15 lbs. per day, 3,225 lbs. at $5	8 06
Meal, 12 lbs. per day, 2,580 lbs. at $\frac{2}{3}$ cents	17 20
	$29 77

Or for three lots, $89.31.

Summary of Cost of Feeding.

During preparatory feeding	$ 15 03
During test	136 98
Till lifted	89 31
	$241 32

Or for each lot of 5 steers, $80.44.

SUMMARY OF FINANCIAL RESULT OF TRANSACTION

Lot No.	Value of Feed Consumed, as per Summary.	Gain in Pounds.	At	Amount.	Net Gain. Each Lot.	Average Net Gain. Per Head.
	$ cts.		Cts.	$ cts.	$ cts.	$ cts.
No. 1	80 44	1,170	8	93 60	13 16	2 63
No. 2	80 44	1,405	8	112 40	31 96	6 39
No. 3	80 44	1,175	8	94 ..	13 56	2 71
		3,750	8	300 00		

Or an average net gain per head on all of $3.91.

SWINE.

The herd on the farm at present consists of :—

Berkshires, 2 boars, 2 sows.
Tamworths, 1 boar, 1 sow.

Since last report, four Berkshire boars and two sows have been sold to farmers for breeding purposes ; five old animals sold for pork and one Tamworth sow exchanged.

POULTRY.

On account of the difficulty experienced in keeping the different breeds separate, the flock on the farm has been reduced to White Wyandottes and Black Minorcas, the flocks of which consist of :—

White Wyandottes, 10 birds.
Black Minorcas, 72 birds.

HORSES.

Since my last report, I have to advise the loss of two horses, one of which died in July and the other was shot in November. The former was one of our brood mares and was sick with inflammation for only a few hours. The latter was one of the horses brought from Ontario when the farm started, and through old age was incapacitated for work.

With the young animals on hand to take their places, there will be sufficient to do the work without purchase.

BEES.

I regret being unable to report any success in bee culture. One swarm was put in winter quarters in November, 1899, in a vacant room in the Superintendent's house, and was returned there in November of the present year. A swarm came off in July but returned to hive almost immediately. This was the only attempt at swarming made during the season. The weight of the hive when taken into the house in November, 1899, was 45 pounds ; this year it was 37 pounds, and no honey whatever had been taken from it during the year.

SUMMER-FALLOWS.

In view of the fact that the crops on fallowed land, except where injured by winds, were fairly good this year, notwithstanding the unfavourableness of the season, and that the crop on stubble was almost a complete failure, it is perhaps advisable in this report, to refer to the various methods which have been employed in making fallows on this farm, and to the results obtained therefrom.

First Method.—Ploughed deep (6 to 8 inches) before last of June ; surface cultivated during the growing season, and just before or immediately after harvest, ploughed 5 to 6 inches deep.

Result.—Too much late growth if season was at all wet ; grain late in ripening, and a large crop of weeds if grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before last of June ; surface cultivated during growing season, and ploughed shallow (3 to 4 inches deep) in autumn.

Result.—Poor crop in a dry year ; medium crop in a wet year. Not sufficiently stirred to enable soil to retain moisture.

Third Method.—Ploughed shallow (3 inches) before last of June ; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year. (The crop on the farm destroyed by winds and dry weather this year was on land worked in this way. The soil was too loose, dried out too easily and was blown away.)

Fourth Method.—Ploughed deep (7 to 8 inches) before last of June, and surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past 13 years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results ; and the plan too frequently followed of waiting till weeds are full grown, and often fully ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture into the soil. The rain must fall on the first ploughing, and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand fold to the myriads already in the soil, and does not materially enrich the land.

SEEDING TO BROME OR WESTERN RYE GRASS TO PREVENT DRIFTING OF SOIL.

On this farm, during the past season, nothing was more apparent than the advantage of having grass-roots in the soil to prevent drifting by the high winds that prevailed at that time.

While the top-soil of fallowed fields was, day after day, being carried away in clouds and the crops dying by inches, the land containing grass-roots was not in any way disturbed, and the injury done to crops was by dry weather alone.

One field had been under Brome grass for five years, was broken in June, and back-set in August, 1899. Another field of rye grass and a mixture of Alsike clover, Lucerne and Brome grass was broken and back-set during the same months, and both were worked quite fine before the seed was sown.

PROTECTION OF GRAIN BY HEDGES.

The various hedges on the farm did good service in protecting the crops from winds, although it so happened that the grain crops were chiefly on fields surrounded by the younger hedges ; otherwise, little or no injury would have been done the grain, notwithstanding the prevalence and severity of the spring winds.

It was found by measurements that for every foot in height, a hedge protects from 50 to 60 feet in width of crop. From 60 to 80 feet the grain was more or less injured, and outside this distance it was completely killed.

INSTITUTE MEETINGS.

During the month of July, I had the pleasure of attending a series of agricultural or institute meetings in Saskatchewan, arranged by the Commissioner of Agriculture for the North-west Territories.

The Commissioner, Mr. G. H. V. Bulyea, Dr. Fletcher, Entomologist and Botanist Experimental Farms, Ottawa, and Mr. Blakeley, representing the *Nor-west Farmer,* of Winnipeg, took part in the meetings.

The first was held at Prince Albert. From there we drove eastward through a magnificent grain and dairying country, and held a meeting at McDowall's school-house. Thence, south-east to Melfort, a distance of sixty miles by trail, the first half of which was through an excellent grazing country, and the other half through one of the finest mixed farming districts I have visited in any of the Territories. The meeting at Melfort was like the country surrounding it, satisfactory in every respect.

Retracing our steps for twenty miles, a meeting was held at Kinistino, the centre of another fine district, in which large herds of cattle, rolling in fat, were everywhere encountered. The meeting was large and intelligent, and as at Melfort, gave indications that when railway facilities are afforded these two sections of the country, they will be second to none in the Territories.

From Kinistino a westerly course was taken, and late at night, and after a long journey, a meeting was held at Harper's View. The meeting was probably the best of the series, not from the point of attendance, but from the eagerness of those present to find out everything that any one of the speakers could tell in regard to farming in all its branches. At this point the finest crops of grain and vegetables encountered on the trip were seen.

St. Louis de Langevin was the next meeting place. This is a point on the south branch of the Saskatchewan River, and was fixed in our memories by a pleasant visit to a large experimental garden, owned and worked by Mr. E. Lefebvre, whose flowers, shrubs, trees, fruit, grain and vegetables gave evidence of a rich soil and very careful and intelligent work.

Other meetings were held at Lindsay, Duck Lake and Rosthern, on the line of railway.

Acting under instructions from the Honourable the Minister of Agriculture, I visited Lethbridge, Alberta, in September, and had a conference with the management of the Lethbridge Irrigation Company, with reference to tree-planting in connection with their system of irrigation ditches.

A trip was also made to Calgary at the time of the Inter-western Provincial Exhibition, with the intention of visiting the irrigation experiment station at that place. Unfortunately, a heavy rain and snow storm raged over Alberta at that time, and it was impossible to see the farm.

This autumn a large institute meeting at Broadview was attended ; and a series of meetings is now being arranged in Eastern Assiniboia by Mr. M. Bulyea, in which I have promised to take part.

DISTRIBUTION OF SAMPLES.

During the months of March, April and May, the following distribution of samples was made to applicants throughout the territories of Assiniboia, Alberta and Saskatchewan.

The number of applicants was, as usual, largely in excess of the supply available for this purpose ; and the stock of seedling trees and shrubs, cuttings of fruit-bushes, rhubarb-roots and tree-seeds grown for the purpose, did not begin to fill all the orders received.

This, and the demand for larger trees by express, indicates a much more lively interest in tree and fruit growing than has heretofore been shown, and it is much to be regretted that, on account of the extremely dry season, our crop of seedlings is this year very small, and will be totally inadequate to fill the applications already beginning to come in.

Besides the seedlings mentioned below, many thousands of maple trees, from 3 to 5 feet in height, were given to settlers of the districts and others, who drove in as far as 50 miles to secure the means of beautifying their homesteads.

Grain.—Wheat, 190 bags, 3 pounds each.
" Oats, 310 bags, 3 pounds each.
" Barley, 160 bags, 3 pounds each.
" Pease, 140 bags, 3 pounds each.
" Flax, 8 bags, 3 pounds each.
" Rye, 20 bags, 3 pounds each.

Potatoes, 322 bags, 3 pounds each.

Tree-seeds, maple, 600 bags, 1 pound each.

Grass-seed, Brome, 300, 1 pound each.

Grass-seed, Western Rye grass, 250 bags, 1 pound each.

Small seeds, 410 packages, containing 2,631 pa. flower-seeds, 631 pa. shrub-seeds, 772 pa. root-seeds, and 278 bags garden pease and beans.

Rhubarb roots, 25 packages.

Tree-seedlings, 361 packages, containing Box-elder seedlings, Cottonwood cuttings. Caragana arborescens seedlings, Plum seedlings and Artemisia cuttings.

Fruit seedlings, 186 packages, containing Plum seedlings, Apple seedlings, Sand-cherry seedlings, and Currant seedlings or cuttings.

CORRESPONDENCE.

During the twelve months ending October 31, 1900, 5,389 letters were received, and 5,033 mailed from this office. In letters received, circular reports on grain and other samples are not counted, and in letters mailed, circulars of instruction sent with grain and other samples are not included.

METEOROLOGICAL.

Month.	Highest Temperature.		Lowest Temperature.		Snow-fall.	Rainfall.		Hours of Sunshine.
	On	Degrees	On	Degrees	Inches.	No. of Days.	Inches.	
1899.								
November	4	58	21	15	1	1	·2	96·9
December	21	41	29	—26	4	......	......	56·9
1900.								
January	19	43	30	—27	2.5	......	......	73·3
February	28	34	8	—37	5	......	......	113·5
March	29	42	4	—27	4.5	......	......	131·6
April	22	81	16	18	......	2	·27	200·4
May	12	94	2	21	......	3	·8	241·4
June	22	106	13	33	......	7	·65	175·3
July	26	97	22	38	......	5	1·73	231·6
August	2	98	28	35	......	15	4·85	171·2
September	3	78	30	25	3	8	2·84	139
October	22	81	28	18	1	6	·4	102·2
Total	......	......	......	......	21	47	11·74	1733·3

I have the honour to be, sir,

Your obedient servant,

ANGUS MACKAY,

Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., November 30, 1900.

To Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour herewith to submit my report of the experiments carried on and progress made in the year 1900.

The winter of 1899 and 1900 was a mild one, the lowest temperature recorded was 9 degrees above zero on February 15. January was mild, the lowest temperature registered being 27 degrees above zero on the 27th, and the lowest in March was 29 degrees above on the 17th, at which date the peach, apricot, nectarine and quite a number of plum trees were in bloom.

The mild weather in the winter months favoured the early development of the fruit buds with the result that many trees having bloomed in the first half of March, and two or three light frosts occurring during and after the time they were in bloom, the fruit failed to set and the apricot, nectarine and peach crop was almost a complete failure.

The spring was mild and wet, and favourable for grass and grain crops, on dry or drained land, up to the arrival of swarms of cut-worms in July, the promise of fine crops of grain, roots and potatoes was good.

The attack of cut-worms was so severe that roots, potatoes and pease suffered very severely, many pieces of pease and potatoes were not worth harvesting. June was very showery, the rainfall for that month being heavy, measuring 10 76-100th inches for the whole month, with 21 rainy days, making the curing of clover hay very difficult. Fortunately haying was begun at Agassiz early in the month and we got the benefit of all the fine weather there was in June, and secured a considerable portion of the clover in fine condition and the remainder was put into the silo.

Clover silage is eaten with better relish than corn, does not need to be cut when putting into the silo, and as two and sometimes three crops can be cut each season, it appears to be a better crop in this province for the purpose. Over thirteen tons per acre for the first cutting and nearly nine for the second and over five for the third cutting made a good yield per acre, and it has been saved as easily in the silo here as corn.

The fruit crop has, on the whole, been a poor one. Strawberries were injured by a frost when they were in bloom, and by cold heavy rains when the crop was ripening. Raspberries and blackberries fared better and were good crops. Cherries and plums suffered from the rot ; the almost constant rains in spring having washed off the fungicides almost as soon as they were applied, and in this way preventing effective work.

HEDGES

The sample hedges continue to grow and attract attention. The flowering hedges are very beautiful in their season, while the evergreens are handsome all the year. Many letters of inquiry about hedges have been answered and visitors to the farm always look them over carefully, many with a view of selecting one, which they will plant on their own grounds.

FOREST TREE PLANTATION.

The forest trees planted in the shelter belt continue to make a strong growth. The oak, ash, maple and other hardwood trees on the mountain side are getting above the ferns and other low growths, as shown in early autumn, when the foliage assumes autumn tints, at which time many of these eastern trees are quite conspicuous.

ORNAMENTAL SHRUBS AND TREES.

This portion of the experimental work has made very fine growth this season, and although in some instances the cut-worms took a considerable share of the foliage, the shrubs have leaved out again and do not appear to be materially injured. The Japanese hydrangeas and the roses continued to bloom up to the sharp frosts which occurred in the beginning of November.

NUT TREES.

The heart-shaped, Japanese and English walnuts all fruited this year, the latter variety for the first time and only a few nuts, but they have grown from very small trees in 1893, when they were planted, to trees of twenty feet high, with wide branching heads and the stems to six to seven inches in diameter at the collar. The Spanish and Japanese chestnuts also fruited and the nuts matured.

As there is considerable inquiry for nut trees in different parts of the province, these nuts have been distributed for planting. The filberts make a strong wood growth, but the pollen begins to mature and falls as early as the middle of January, and by the time the female blossom opens (here generally early in April), the pollen is nearly all blown away and lost ; in consequence of this the crop is light. It is intended to plant a few healthy bushes of the wild hazel nut in hopes that this may correct the partial barrenness of the more valuable cultivated varieties, by supplying pollen.

The hard-shelled almonds fruited again this year, but none of the soft-shelled varieties produced any fruit.

DITCHING.

About 680 yards of open ditch, 4 feet wide on top, 3 feet deep and 1 foot wide in the bottom, has been dug this fall, connecting at the outlet with the municipal ditch. The ditch as far as completed is doing good service, and when carried through to the terminus will, it is hoped, enable us to cultivate and crop land that has heretofore been too wet to work.

BREAKING AND CLEARING.

About six acres of land was broken up and cropped this year, and ten more cleared of all timber and brush and seeded to grass and clover. It is expected in this way to get a catch of grass and by pasturing the land for a few years with cattle and sheep, give the hardwood stumps time to rot, and the pasturing will aid in killing out the ferns, and in this way materially lessen the cost of clearing land, especially where there are not many fir or cedar trees. These, of course, do not rot for very many years.

LIVE STOCK.

The six horses purchased when the farm was first occupied, are still in good condition for work.

The cattle mentioned in my report of last year have all been disposed of but one Shorthorn cow, one Shorthorn heifer and one grade cow and calf ; since then a fine Shorthorn bull calf has been procured from the Experimental Farm at Indian Head, and thirteen head of cattle bought for feeding, making eighteen head of cattle at present on the Experimental Farm.

SHEEP.

The four Dorset horned ewes and one ewe lamb wintered have produced six lambs this year; two buck lambs have been sold and one buck and three ewe lambs on hand. One buck lamb and the old ram wintered last year have been sold, which leaves nine head of sheep on the farm at present.

PIGS.

The stock at present consists of one Berkshire boar, and one sow, one Tamworth boar, one Tamworth sow, aged, one young Tamworth sow, and eight Tamworth pigs ; eight young cross-bred pigs, making twenty-two pigs of all sorts at present on the farm. The Tamworth pig appears to gain in popularity the better it is known.

BEES.

Three swarms of bees wintered, and were ready for work in the spring. Only one swarm has been saved this year, but all these, judging by their weight, are well supplied with honey for the winter.

POULTRY.

At present there are four breeds of poultry here : Brahmas, White Wyandottes, Barred Plymouth Rocks, and Black Minorcas.

The White Leghorns were sold this year, as they had been tested for a number of years, and were seldom inquired for.

The Barred Plymouth Rocks were procured this fall, to put in place of the White Leghorns.

The Brahmas, as in previous years, have been good layers, and the chickens can easily be made to weigh nine pounds, live weight, per pair, at four months old.

The White Wyandottes are good layers, and the chickens, if well cared for, will weigh about eight and a-half pounds, live weight, per pair, at four months old. The White Wyandotte is a round-bodied, short-legged, close-feathered fowl, and their feathers will probably shed the rain better than the Brahmas, as these are rather open-feathered. Their bare legs also may make the White Wyandotte, when full grown, a little better suited to this climate, than the Brahma.

Chickens of all breeds require to be warmly and carefully housed, sheltered from cold spring rains.

The Black Minorcas are the best layers here, and their eggs are large, but the chickens do not make satisfactory broilers.

All the fowls are comfortably housed and regularly fed, but they are never forced either for eggs or for fattening. They are all allowed to run at large except when put into pens for breeding purposes—from January to July.

The cocks of each breed are changed every year, to prevent inbreeding, and with ordinary good care the chickens are strong and healthy.

EXPERIMENTS WITH SPRING WHEAT.

Forty-nine varieties of wheat were tested this year. They were on sandy loam, all sown on April 10, on plots of one-fortieth of an acre each. The seed for this test was from heads selected last year. Eight plots were sown with seed taken from the produce of the test plot, when threshed, without selecting. All were sown on soil of similar character and treatment. The results do not in every case show better results from the selected seed, but it should be borne in mind that the seed for all the plots here has been carefully screened, and efforts made to secure the largest and most perfect grains for seed for many years.

The plots grown from the selected heads presented a more uniform appearance, and ripened more evenly than the others. There was no rust or smut on any of the plots.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs.
1	Huron	Aug. 2.	113	46	Strong	2-3	Bearded	3	80	30	20	61½
2	Monarch	" 10.	121	50	"	3¼	Beardl's	2	400	29	30	61
3	Red Fife	" 9.	120	48	"	3¼	"	1	1,560	29	30	62
4	Crown	" 4.	115	46	"	3½	Bearded	2	1,000	28	30	60¾
5	White Russian	" 11.	122	38	"	3½	Beardl's	2	1,200	28	10	60
6	Fraser	July 30.	111	38	"	3	Bearded	2	1,200	27	40	61¼
7	Preston	Aug. 3.	114	44	"	3	"	2	80	27	10	60¼
8	Wellman's Fife	" 10.	121	50	"	3	Beardl's	2	880	26	30	60¾
9	Beauty	" 10.	121	40	Medium	3¼	"	2	720	26	30	60½
10	Ladoga	" 2.	113	44	Strong	3¼	Bearded	2	600	26	20	60¾
11	Advance	" 2.	113	46	"	2½	"	2	400	26	20	63½
12	White Connell	" 9.	120	42	"	3	Beardl's	2	1,200	26	..	61
13	Progress	" 11.	122	48	"	3¼	"	2	1,000	26	..	61½
14	Goose	" 9.	120	44	"	3¼	Bearded	2	1,040	26	..	61
15	Vernon	" 2.	113	42	"	2½	"	2	1,680	25	40	62¼
16	Blair	" 4.	115	40	Medium	2½	Beardl's	2	400	25	40	61¾
17	Pringle's Champlain	" 10.	121	46	"	3	Bearded	2	1,680	25	20	60¼
18	Norval	" 3.	114	42	Strong	2½	"	2	600	25	10	60¾
19	Plumper	" 3.	114	38	Weak	3	"	2	440	25	..	60¾
20	Red Fern	" 10.	121	42	Strong	2½	"	2	1,600	24	40	61¾
21	Alpha	" 10.	121	50	"	3¼	Beardl's	2	1,000	24	30	62¼
22	Herisson Bearded	" 10.	121	38	Weak	2¼	Bearded	2	480	24	20	61¼
23	White Fife	" 10.	121	38	Medium	2½	"	2	400	24	20	61¼
24	Blenheim	" 3.	114	44	Strong	3	"	2	1,120	24	10	62
25	Roumanian	" 10.	121	48	Medium	3¼	"	2	160	24	10	62
26	Red Swedish	" 9.	120	42	Strong	3¼	"	2	1,040	24	10	60¾
27	Dufferin	" 3.	114	40	Medium	2½	"	2	980	24	..	61¼
28	Byron	" 2.	113	38	Weak	2¾	"	2	400	23	30	61
29	Dion's	" 9.	120	40	Strong	3¼	"	2	1,500	23	30	61½
30	Countess	" 3.	114	38	Medium	2½	Beardl's	1	1,800	23	20	61¼
31	Clyde	" 9.	120	40	"	3¾	"	2	480	23	20	62
32	Percy	" 10.	121	42	"	3	"	2	80	23	10	60¾
33	Rideau	" 11.	122	42	Strong	2¾	"	2	80	23	10	61½
34	Dawn	" 10.	121	38	"	2¾	"	1	1,760	22	30	61¾
35	Captor	" 3.	114	46	"	2¾	"	2	520	22	20	62¼
36	Crawford	" 3.	114	36	Weak	2¼	"	1	1,920	22	20	60¾
37	Stanley	" 4.	115	42	Strong	3¼	"	2	600	22	20	63
38	Hungarian	" 9.	120	46	Medium	3½	Bearded	2	1,220	22	20	62
39	Rio Grande	" 11.	122	38	Strong	3	"	2	1,280	22	20	60
40	Colorado	" 10.	121	40	Medium	3	"	2	600	21	20	60
41	Laurel	" 13.	124	46	Strong	3½	Beardl's	2	560	21	10	61½
42	Ebert	" 3.	114	34	Weak	2¼	"	1	1,560	21	..	60
43	Beaudry	" 10.	121	38	Strong	3	Bearded	2	360	20	30	62¼
44	Mason	July 31.	111	44	Weak	2½	Beardl's	2	1,600	20	20	61
45	Admiral	Aug. 10.	121	40	Strong	4	"	1	1,920	20	10	61¼
46	Early Riga	July 30.	110	34	Weak	2½	"	2	....	20	..	60
47	Weldon	Aug. 13.	124	36	"	2¾	"	1	1,870	18	20	60
48	Campbell's White Chaff	" 11.	122	40	Medium	3	"	1	1,760	17	10	61
49	Harold	July 30.	110	36	Weak	2¼	Bearded	1	1,960	16	50	60¼

Spring Wheat—Test of Varieties Grown from Screened Seed.

Name of Variety.	Date of Sowing,	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs	
Wellman's Fife	April 11.	Aug. 13.	123	50	Stiff & bright	3	Beardless.	2	1,200	29	20	61	None.
White Connell.	" 11.	" 11.	121	42	" " .	3	" .	2	960	27	20	61¼	"
Colorado......	" 11.	" 11.	121	38	Medium...	3	" .	2	1,200	24	20	60	Slightly.
Preston.	" 11.	" 5.	115	40	Stiff & bright	2½	" .	1	1,720	24	20	61¼	None.
White Russian.	" 11.	" 13.	123	38	Medium....	3½	" .	1	1,360	21	40	61	Slightly.
White Fife...	" 11.	" 12.	122	36	Weak	2	" .	1	1,120	21	..	60	"
Red Fife... .	" 11.	" 10.	120	46	Stiff & bright	3	" .	2	....	21	..	61	"
Percy.	" 11.	" 12.	122	38	Weak	2½	" .	1	1,800	20	30	60½	"

EXPERIMENTS WITH OATS.

Sixty-one varieties of oats were sown in the uniform trial plots. All were sown on sandy loam, on April 16, except Salzer's Big Four, which was not on hand in time to be sown with the others, but was sown alongside on May 11. The size of the plots was one-fortieth acre each. The rust attacked some varieties rather severely, and lessened the yield and damaged the sample. The cut worm, too, injured the later sorts.

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Tons	Lbs.	Bush.	Lbs.	Lbs	
1	Prolific Blk Tartarian...	Aug. 13	118	48	Strong...	10	Sided	3	1,440	59	14	41	Badly.
2	Black Beauty......... .	" 6	111	48	" ..	11	Branching	3	1,000	58	28	39	Slightly.
3	Holstein Prolific........	" 13	118	42	" ..	10	" .	4	80	58	28	35	Badly.
4	Thousand Dollar.......	" 8	113	48	" ..	10	" .	3	800	58	8	34	Slightly.
5	Abyssinia...............	" 13	118	50	" ..	11	" .	3	920	57	22	35½	"
6	Columbus	" 8	113	48	" ..	10	" .	3	888	57	12	34	"
7	Golden Giant..	" 15	120	50	Medium.	11	Sided.....	3	600	57	12	34	Badly.
8	Early Blossom..........	" 10	115	42	" ..	8	"	3	1,600	56	16	33½	Slightly,
9	California Prolific Blk...	" 13	118	46	Strong...	11	"	3	1,280	56	6	34	"
10	Kendal	" 14	119	50	" ..	10	"	3	200	55	20	34	Badly.
11	Early Golden Prolific...	" 8	113	48	" ..	9	Branching	3	200	55	20	34	Slightly.
12	Mennonite.	" 8	113	40	" ..	9	" .	3	200	54	24	34	"
13	Black Mesdag..........	" 7	112	40	" ..	10	" .	2	1,000	54	24	34	"
14	Improved American	" 11	116	48	" ..	11	" .	2	1,800	54	14	34	Badly.
15	Cromwell...............	" 9	114	50	" ..	11	" .	3	200	54	4	33	Slightly.
16	Oderbruch......	" 8	113	46	" ..	9	" .	3	800	53	28	34	None.
17	California Prol. Blk. Imp	" 13	118	46	" ..	11	Sided.....	3	940	53	18	34	Slightly.
18	American Triumph	" 13	118	48	Medium.	10	Branching	3	560	53	18	34	Badly.
19	Holland..............	" 13	118	46	Stiff.....	10	Sided.....	2	1,800	53	8	34	Slightly.
20	Lincoln	" 11	116	44	Weak. ..	9	Branching	2	1,200	53	8	33	"
21	Abundance.............	" 13	118	44	Stiff.....	10	" .	2	1,280	52	22	34	"
22	Banner	" 13	118	48	"	9	" .	3	1,120	52	22	32	Badly.
23	Improved Ligowo, Impt.	" 9	114	44	"	10	" .	2	1,200	52	12	34	Slightly.
24	Black Tartarian, Impt..	" 13	118	42	Medium.	10	Sided.....	2	800	52	12	33	Badly.
25	Flying Scotchman......	" 8	113	46	Stiff.....	10	Branching	3	1,200	51	16	32	"
26	Master................	" 15	120	42	Medium.	8	" .	2	1,680	51	16	34	"
27	Olive	" 11	116	48	" ..	10	Sided.....	3	.....	51	16	34	Slightly.
28	Siberian, O.A.C........	" 14	119	42	" ..	9	"	2	1,000	51	6	34	Badly.

SPRING WHEAT—TEST OF VARIETIES—*Con.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Tons	Lbs.	Bush.	Lbs.	Lbs	
29	New Zealand.	Aug. 14	119	48	Stiff.....	9	Branching	3	.....	50	30	34	Badly.
30	Hazlett's Seizure........	" 13	118	50	"	10	" .	2	1,360	50	30	34	"
31	Rosedale...	" 15	120	48	"	9	" .	2	1,280	50	20	34	"
32	Buckbee's Illinois	" 14	119	44	Medium.	9	" .	2	1,360	50	10	34	"
33	Salines............	" 13	118	44	Stiff. ...	10	" .	3	400	50	..	34	Slightly.
34	American Beauty.......	" 15	120	46	"	9	" .	2	1,280	50	..	34	Badly.
35	Improved Ligowo	" 9	114	42	Medium.	9	" .	2	1,800	49	24	34	Slightly.
36	White Schonen.........	" 9	114	48	" ..	9	" .	2	1,480	49	14	34	"
37	Early Maine...... ..	" 14	119	44	" ..	9	Sided.....	2	1,360	49	4	32	Badly.
38	Milford	" 14	119	44	" ..	9	Branching	3	1,600	48	28	33	"
39	Golden Tartarian.	" 13	118	42	Stiff.....	10	Sided.....	3	.....	48	18	34	Slightly.
40	White Russian	" 8	113	40	Medium.	9	Branching	3	1,500	48	18	34	"
41	Early Dawson	" 4	109	50	Stiff.....	11	" .	2	1,200	48	18	34½	None.
42	Bavarian...............	" 13	118	46	"	10	" .	2	1,360	47	32	33	Badly.
43	Cream Egyptian........	" 15	120	48	Medium	10	" .	2	1,300	46	16	33	"
44	Pense.............. ..	" 15	120	48	Stiff.....	10	Sided.....	2	400	46	16	33	"
45	White Giant.	" 9	114	42	"	10	Branching	2	400	46	6	34	Slightly.
46	Miller.................	" 13	118	46	Medium.	8	" .	2	1,300	45	30	33	"
47	Early Gothland.... ..	" 9	114	48	Stiff.....	9	" .	2	1,200	45	30	34	"
48	Golden Beauty	" 15	120	46	"	10	" .	2	1,520	45	30	33	Badly.
49	Early Archangel.. ..	" 13	118	42	Medium.	9	" .	2	1,680	45	20	33	"
50	Salzer's Big Four.......	" 27	107	50	Stiff.....	9	Sided.....	3	400	45	20	34	Slightly.
51	Wallis....	" 13	118	44	Medium.	9	Branching	3	80	43	18	34	Badly.
52	Joanette............ ..	" 16	119	38	Weak ...	9	" .	2	1,120	43	18	33	"
53	Russell	" 14	119	42	Medium.	10	" .	2	1,740	43	18	34	"
54	Brandon.	" 11	116	46	Stiff.. ..	10	" .	2	1,200	43	18	34	Slightly.
55	Bonanza.	" 10	115	48	Medium.	9	" .	2	1,200	42	18	33½	Badly.
56	King	" 13	118	48	Stiff.....	10	" .	2	1,200	42	18	34	"
57	Sensation	" 8	113	38	Weak. ..	9	" .	2	800	42	4	33	Slightly.
58	Wide Awake.	" 14	119	46	Medium.	9	" .	2	880	41	18	32½	Badly.
59	Newmarket	" 13	118	44	" ..	9	" .	2	1,300	40	..	33	Slightly.
60	Oxford.....	" 14	119	42	Stiff.....	10	" .	2	400	38	28	34	Badly.
61	Danish Island....	" 10	115	48	"	10	" .	2	160	37	22	34	"

EXPERIMENTS WITH BARLEY.

Forty-five varieties of barley were tested, eighteen of which were two-rowed sorts and twenty-seven were six-rowed. They were all on sandy loam of fairly uniform character; the size of the plots was one-fortieth of an acre, and they were all sown on April 20 and 21. The seed for these plots had been got from heads selected before the crop was harvested in 1899. Four plots of two-rowed and six of six-rowed sorts were sown alongside, with seed taken from the general crop after the plots were threshed. This was prepared as usual by screening, reserving only the plump grain for seed. While the results are not uniform, the advantage in most instances is decidedly in favour of the seed from the selected heads.

There was no rust or smut on any of the plots in the test of varieties.

Two-rowed Barley—Test of Varieties.

No.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.	Tons.	Lbs.	Bush.	Lbs,	Lbs.
1	Jarvis	Aug. 1	102	44	Strong	3¼	4	400	41	32	48¼
2	Nepean	" 1	102	47	"	3½	4	800	41	22	49¾
3	Danish Chevalier	" 9	110	44	"	3½	2	1,380	37	4	48¾
4	Prize Prolific	" 8	109	42	Medium	3½	2	1,520	36	12	48½
5	Victor	" 8	109	46	Strong	3½	4	....	34	38	48¼
6	French Chevalier	" 8	109	42	"	3½	3	1,000	34	28	48½
7	Beaver	" 8	109	43	Weak	3	3	1,400	34	8	49
8	Harvey	" 9	110	42	Strong	3¼	3	1,200	33	28	49¼
9	Kinver Chevalier	" 7	108	38	"	3½	3	80	32	24	48½
10	Bolton	" 1	102	44	"	3½	4	80	31	42	48¾
11	Canadian Thorpe	" 7	108	44	"	3½	3	440	31	32	49
12	Newton	" 7	108	41	Medium	3	3	960	31	22	48
13	Sidney	" 6	107	36	Strong	3	3	1,120	30	20	48¼
14	Dunham	" 3	104	50	"	3½	3	1,000	30	10	48
15	Fulton	" 9	110	46	"	3½	3	400	30	10	48
16	Leslie	" 8	109	44	"	4	2	1,600	29	18	48¼
17	Logan	" 3	104	48	"	3	3	600	29	18	48½
18	Clifford	" 7	108	42	"	3	2	320	28	8	48

Six-Rowed Barley—Test of Varieties.

1	Mensury	July 27	97	48	Stiff, bri't.	3	3	800	44	8	49
2	Nugent	" 27	97	44	"	2½	4	80	41	12	49¾
3	Odessa	" 27	97	46	"	3	3	600	40	20	48
4	Claude	Aug. 8	109	43	"	3½	3	400	40	10	48
5	Yale	" 8	109	44	"	3¼	3	200	40	..	48
6	Petschora	July 24	94	40	"	2½	3	120	39	38	47¾
7	Baxter	" 27	97	46	"	2½	3	800	38	42	47½
8	Common	Aug. 3	105	40	"	3	2	1,000	38	42	47
9	Trooper	" 8	110	40	"	3	3	1,200	38	32	50
10	Albert	July 31	102	38	"	3	3	1,360	38	32	48¼
11	Oderbruch	" 25	96	46	"	2¾	2	1,760	38	16	48¾
12	Blue Long Head	" 31	102	42	"	2½	2	1,720	37	44	46¾
13	Champion	" 24	95	40	"	2½	2	960	37	32	47¾
14	Excelsior	" 31	102	42	"	2½	3	1,000	37	4	46
15	Vanguard	" 31	102	40	"	3	3	1,280	36	42	47¼
16	Phœnix	" 28	99	44	"	2½	2	1,600	36	22	50
17	Argyle	Aug. 1	103	38	Medium	2¼	3	520	36	22	48¾
18	Pioneer	July 31	102	40	Stiff, bri't.	2-3	2	1,680	35	40	48
19	Mansfield	" 31	102	34	"	2½	2	1,600	33	40	47¾
20	Royal	Aug. 1	103	44	Medium	2	2	800	32	14	49
21	Garfield	July 31	102	40	"	3	3	560	32	10	48
22	Brome	Aug. 1	103	48	Stiff, brit'.	3	3	1,512	32	4	48
23	Summit	" 8	110	42	Weak	4	2	400	29	38	48¾
24	Stella	" 8	110	36	Medium	3½	2	200	29	28	46¾
25	Empire	July 31	102	42	"	3	2	1,600	28	16	47¾
26	Success	" 24	95	38	"	2¼	1	1,160	27	34	47½
27	Hulless Black	Aug. 3	105	40	"	2	2	100	26	40	56

BARLEY—TEST OF VARIETIES.

(Grown from screened seed—Two-rowed sorts.)

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.	Tons.	Lbs.	Bush.	Lbs.	Lbs.	
Sidney.............	Aug. 8..	109	36	Strong ...	3	2	400	31	12	49	Slightly.
Canadian Thorpe...	" 8..	109	44	"	3½	2	280	29	16	48	None.
Danish Chevalier...	" 18..	118	39	"	3	1	1,920	28	46	48¼	"
Beaver	" 15..	115	38	Weak	3	2	600	24	16	48	"

SIX-ROWED SORTS.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
Royal............	Aug. 4..	105	40	Medium..	2	1	800	30	..	48	Slightly.
Trooper...........	" 8..	110	40	Strong ...	3	2	600	28	26	48	None.
Mensury...... ..	July 27..	97	44	"	3	1	1,880	27	44	48¼	Slightly.
Champion.........	" 26..	96	36	"	2½	2	....	27	24	48	"
Odessa.............	" 28..	98	40	Medium..	2½	2	800	27	4	47¾	None.
Petschora..........	" 26..	96	38	" ..	2½	2	....	25	20	48	Slightly,

EXPERIMENTS WITH PEASE.

There were fifty-seven varieties of pease tested this year. All were sown on April 3, on sandy loam, on plots measuring one-fortieth of an acre each. The land was in fine condition, but shortly after the pease were sown heavy rains began and continued many days, and they were injured to a considerable extent, many of them decaying in the ground. When the earliest varieties were beginning to ripen, the cut-worm came, and in some cases almost destroyed the crop.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Growth.	Length of Pod.	Size of Pea.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs
1	Early Britain..............	Aug. 9..	127	66	Medium..	2½	Large	3	720	32	10	61⅓
2	Duke	" 13..	131	48	Weak	3½	" ...	2	800	30	20	61¾
3	Fenton	" 13..	131	54	Medium..	2½	"	2	1,560	30	10	60½
4	Daniel O'Rourke...........	" 4..	122	40	" ..	3	Small	2	880	29	10	61½
5	White Wonder.............	" 15..	133	40	" ..	2½	Medium..	2	1,580	29	10	62
6	German White.............	" 11..	129	54	" ..	3	" ..	2	1,120	29	..	62⅓
7	Bruce	" 14..	132	58	" ..	3½	Large	2	1,520	29	..	61¼
8	Pride	" 9..	127	44	Weak	3	"	1	1,960	28	20	61½
9	Perth	" 9..	127	60	"	2½	"	2	1,680	28	.	61
10	Large White Marrowfat....	" 15..	133	50	Medium..	2	"	2	1,460	27	50	60
11	Wisconsin Blue............	" 11..	129	52	" ..	3	Small	2	1,360	27	30	62¼
12	Prince......................	" 9..	127	46	Strong....	2½	Large	2	400	27	20	61¼
13	Lanark..	" 4..	122	42	"	2½	"	2	960	27	20	62
14	French Canner.............	" 9..	127	34	Medium..	2¼	Medium..	2	1,200	27	20	62
15	Crown	" 7..	125	52	" ..	2½	Small	2	600	26	40	61¼
16	Herald	" 11..	129	50	" ..	3	Large	2	80	26	30	61¼

PEASE—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Growth.	Length of Pod.	Size of Pea.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs
17	Arthur	Aug. 9..	127	40	Medium..	3	Large....	1	1,360	26	10	62
18	Harrison's Glory	" 11..	129	38	" ..	2½	"	2	1,200	26	..	60½
19	Black Eyed Marrowfat	" 10..	128	56	Weak....	3	"	2	600	26	..	60
20	Victoria	" 15..	133	66	"	3	Small....	2	1,000	26	..	60½
21	Picton	" 9..	127	68	Medium..	3¼	Medium..	2	1,800	26	..	62¼
22	Macoun	" 13..	131	64	Weak....	3	Large....	2	1,280	26	..	60¼
23	Archer	" 13..	131	60	"	2½	Medium..	2	1,920	25	50	60½
24	Elephant Blue	" 9..	127	48	Medium..	2½	" ..	2	1,000	25	50	61¼
25	Canadian Beauty	" 15..	133	60	" ..	3½	Large....	2	1,920	25	40	61¾
26	Trilby	" 8..	126	54	" ..	3	Medium..	2	600	25	20	60
27	New Potter	" 10..	124	58	Weak....	2½	Large....	2	..	25	10	60½
28	Chancellor	" 15..	133	60	Medium..	3¼	Small.. .	2	1,440	24	40	61
29	Centennial	" 13..	131	54	" ..	3	Medium..	2	320	24	40	61¼
30	Agnes	" 14..	132	60	" ..	3¼	Large....	2	1,040	24	40	60¾
31	English Gray	" 9..	127	54	" ..	3	Medium..	2	1,520	24	30	61½
32	Fergus	" 13..	131	60	Weak...	3½	Small....	2	1,200	24	30	60½
33	Gregory	" 14..	132	60	"	4	Medium..	2	1,600	24	20	60
34	Mackay	" 9..	127	56	"	3	Small....	2	1,340	24	..	60¼
35	Elliot	" 14..	132	48	Medium..	2½	....	2	400	23	30	60
36	Carleton	" 9..	127	58	Weak....	3	Medium..	2	1,240	23	20	60
37	Vincent	" 9..	127	50	Medium..	3	Large....	2	1,240	23	..	60½
38	Prussian Blue	" 15..	133	60	" ..	3	Medium..	2	80	22	40	61
39	King	" 10..	128	50	" ..	3	Large....	1	1,400	22	20	60¼
40	Dover	" 13..	131	46	Weak....	3	....	2	440	22	20	60¾
41	Bright	" 14..	132	60	"	3	Medium..	1	1,960	21	40	60
42	Chelsea	" 15..	133	48	"	3	....	2	640	21	20	60¾
43	Cooper	" 11..	129	50	Medium..	2½	Large....	1	600	21	..	59¾
44	Oddfellow	" 8..	126	48	Weak....	2½	Medium..	1	1,520	21	..	61½
45	Mummy	" 11..	129	56	Medium..	2½	" ..	2	320	20	30	61
46	Kent	" 15..	133	56	Weak....	3	Large....	2	400	19	40	60
47	Pearl	" 15..	133	50	"	3	....	2	400	19	40	60
48	Grass Pea	Sept. 2..	144	36	Medium..	2	Small....	..	..	19	40	60
49	Nelson	Aug. 10..	128	66	Weak....	3	Medium..	2	560	19	10	60¼
50	Golden Vine	" 11..	129	62	Medium..	2½	Small....	2	40	19	..	62
51	Bedford	" 15..	133	58	Weak....	3	Medium..	2	1,000	18	50	60½
52	Elder	" 9..	127	58	" ...	2½	....	2	600	18	..	60
53	Multiplier	" 6..	124	50	Strong....	3	Small....	2	1,800	18	..	60½
54	Prince Albert	" 15..	133	54	Weak....	2	"	2	80	16	50	60½
55	Creeper	" 9..	127	56	" ...	3	"	1	1,120	15	40	61¼
56	Alma	" 9..	127	47	"	3	"	1	200	15	..	60
57	Paragon	" 11..	129	54	" ...	2	Medium..	1	1,240	15	..	60

EXPERIMENTS WITH INDIAN CORN.

Thirty-two varieties of corn were planted in this test. All were planted on May 29 and 30. The weather throughout June and the first half of July was so wet and cool that the corn made very poor growth, and presented a yellowish sickly appearance. After the middle of July it picked up a little, but the season, on the whole, has been very unfavourable for this crop, and very few varieties made even fairly good ears of roasting condition by October 3, when it was cut. The land was a sandy loam, and in good condition for corn, having had a thick seeding of clover turned under in early May. All the varieties were tested in drills and in hills, the drills being 3 feet apart, and the hills 3 feet apart each way, as in previous years. The drills average a little the heaviest yield. The yields have been calculated from the weight of green fodder cut from two rows, each 66 feet long.

Indian Corn.—Test of Varieties.

	Name of Variety.	Character of Growth.	Description of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
				Inches.						Tons.	Lbs.	Tons.	Lbs.
1	Superior Fodder	Very strong	Dent	100-120	Very	Sept. 4	Sept. 18	Oct. 3	Early milk	26	800	25	1480
2	Mammoth Cuban	"	"	96-112	"	" 1	" 16	" 3	"	26	680	25	820
3	Pride of the North	"	"	112-120	"	" 8	Oct. 1		In silk	26	360	22	1430
4	Red Cob Ensilage	"	"	115-120	"	" 1	Sept. 22	Oct. 3	Early milk	26	360	24	1280
5	Cloud's Early Yellow	Strong	"	108-115	"	" 1	" 22	" 3	"	25	1040	25	600
6	Extra Early Huron	"	"	108-120	"	Aug. 21	" 10	Sept. 20	Late milk	24	1720	20	1250
7	Early Mastodon	Fair	"	90-100	"	" 21	" 10	" 20	"	24	1500	25	820
8	Champion White Pearl	"	"	100-120	"	Sept. 3	" 24	Oct. 3	Early milk	23	530	22	100
9	Early Yellow Long Eared	"	"	70- 76	"	" 1	" 22	" 3	"	21	680	18	520
10	Giant Prolific Ensilage	Strong	"	110-120	"	" 1	" 15	" 3	"	21	570	20	1800
11	King of the Earliest	Medium	"	100-108	Medium	Aug. 16	" 3	" 3	"	21	1580	20	40
12	Salzer's All Gold	"	"	72- 80	Very	" 14	" 1	Sept. 14	Glazed	20	1360	18	1070
13	Country Gentleman	Fair		80- 90	Medium	Sept. 20	Oct. 3		In tassel	19	280	17	1530
14	Mammoth 8 Rowed Flint	Strong		95-110	Very	Aug. 16			Roasting ear	18	1620	14	1810
15	Thoroughbred White Flint	"	Flint	100-115	"	" 1	Sept. 22		Early milk	18	1180	17	980
16	Evergreen Sugar	Fair		85- 90	"	" 1	" 24		In silk	18	960	13	1060
17	Pearce's Prolific	Strong		. ..-110	"	" 28	" 20		Late milk	18	630	17	540
18	Angel of Midnight	Fair		86- 96	"	" 30	" 18		Early milk	17	760	16	780
19	Yellow 6 Weeks Extra	"		96-110	Fair	" 14	" 1		Glazed	17	760	16	1440
20	Early Butler	Strong		110-120	Very	" 18	" 10		Roasting ear	17	320	18	300
21	White Cap Yellow Dent	"	Dent	105-110	"	" 20	" 15		" "	17	320	16	780
22	Selected Leaming	Medium		100-110	Medium	" 28	" 15		Early milk	16	670	14	1480
23	Kendall's Early Giant	Fair		90-100	Very	Sept. 1			"	26	10	13	1720
24	North Dakota White	Strong		84- 90	Medium	Aug. 20	Sept. 8		Late milk	15	800	14	1040
25	Sanford	"		100-108	Very	Sept. 1			Early milk	15	690	13	1280
26	Canada White Flint	"	Flint	80- 90	Medium	" 6	Sept. 22		Roasting ear	15	580	14	930
27	Compton's Early	"		100-106	Very	" 15			Early milk	15	360	14	930
28	Longfellow	"		90-100	"	" 3			Late milk	15	360	14	1700
29	Salzer's Earliest Ripe	Fair		48- 54	Medium	Aug. 11	Sept. 1	Sept. 15	Glazed	14	1810	13	1610
30	North Dakota Yellow	Poor	Flint	48- 60	"		" 1		"	14	1480	13	1390
31	Extra Early Szekely	Fair		50- 60	"	Aug. 28	" 10		Late milk	13	1280	13	730
32	Mitchell's Extra Early	"		48- 60	"	July 21	Aug. 2	Sept. 1	Ripe	11	1210	11	110

INDIAN CORN PLANTED AT DIFFERENT DISTANCES APART.

Three varieties of corn were chosen for this test, and the distances ranged from 21 inches apart to 3½ feet. The plants were thinned to 6 inches apart in the rows. The closer planting has in each case given the heaviest yield, but the ears were fewer, not so well filled out, nor so long or as well matured as where the rows were wider apart. The hills were of equal distance apart, and were thinned to three or four strong plants in each hill. The soil was sandy loam, and the yields per acre have been calculated from the weight of green corn cut from two rows, each 66 feet long.

Name of Variety.	Date of Sowing.	Distance apart in rows.	Distance apart in hills.	Condition when cut.	Weight per acre grown in rows.	Weight per acre grown in hills.
					Tons. Lbs.	Tons. Lbs.
Longfellow	May 23	21 inches apart	21 inches apart	Early milk	19 228	21 581
"	" 23	28 "	28 "	"	21 145	21 1843
"	" 23	35 "	35 "	"	17 1074	15 1228
"	" 23	42 "	42 "	"	18 1528	17 1384
Champion White Pearl	" 23	21 "	21 "	"	32 1820	31 1206
" "	" 23	28 "	28 "	"	25 1055	26 244
" "	" 23	35 "	35 "	"	24 428	23 499
" "	" 23	42 "	42 "	"	18 1714	18 1431
Selected Leaming	" 23	21 "	21 "	"	30 1166	30 852
" "	" 23	28 "	28 "	"	23 671	22 1822
" "	" 23	35 "	35 "	"	22 1962	22 1030
" "	" 23	42 "	42 "	"	17 1263	16 246

EXPERIMENTS WITH TURNIPS.

Twenty-eight varieties of turnips were tested, two sowings of each variety being made. The first on May 18 and the second on June 1, and the roots from both sowings were pulled on October 23. The land was similar in character and preparation to that on which the mangels were sown, and, but for the damage done to the crop by cut-worms it would have been a very heavy one as the stand was even and very promising when they came up. The roots averaged small but uniform, and the quality is very good. Four rows of one hundred feet each were sown of each variety at both sowings, and the yield per acre has been computed from 66 feet of the two centre rows in each case.

TURNIPS.—TEST OF VARIETIES.

No.	Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Perfection Swede	36	160	1,202	40	31	920	1,048	40
2	West Norfolk Red Top	28	1,200	953	20	22	....	733	20
3	Bangholm Selected	26	1,680	894	40	25	820	847	
4	Elephant's Master	26	800	880	....	22	220	737	
5	Mammoth Clyde	25	1,920	865	20	25	1,040	850	40
6	Imperial Swede	25	1,920	865	20	22	1,020	753	20
7	Champion Purple Top	24	1,280	821	20	26	1,680	894	40
8	Selected Purple Top	24	1,280	821	20	18	80	601	20
9	Drummond Purple Top	20	1,580	693	...	19	1,600	660	
10	Prize Winner	19	1,380	656	20	19	620	660	20
11	Hartley's Bronze	19	1,160	652	40	19	620	660	20
12	Shamrock Purple Top	19	280	638	....	15	800	513	20
13	Halewood's Bronze Top	18	1,400	623	20	14	1,040	484	
14	New Arctic	18	520	608	40	16	1,880	564	40
15	Hall's Westbury	18	80	601	20	20	700	678	20
16	Prize Purple Top	18	80	601	20	16	560	542	40
17	Monarch	17	1,970	597	50	16	120	535	20
18	Giant King	17	1,860	597	40	15	360	506	
19	Kangaroo	17	1,860	597	40	13	400	440	
20	Carter's Elephant	17	1,200	586	40	16	560	542	40
21	Sutton's Champion	17	1,080	584	40	15	1,240	520	40
22	Selected Champion	17	320	572	....	16	560	542	40
23	Jumbo	17	320	572	....	15	1,680	528	
24	East Lothian	16	1,000	550	....	11	1,760	396	
25	Marquis of Lorne	16	780	546	20	16	1,660	561	
26	Skirvings	16	560	542	40	18	80	601	20
27	Magnum Bonum	15	1,680	528	....	19	280	638	
28	Webb's New Renown	15	1,680	528	...	11	1,980	399	40

EXPERIMENTS WITH MANGELS.

Twenty-two varieties of mangels were tested this year. The soil was a sandy loam which had been in clover in 1899 ; the clover sod was turned under in the autumn of 1899, when the land was given a dressing of stable manure, which was well-worked into the soil with the spading-harrow and drag. The land was in good condition when the first sowings were made, April 25. Before the second sowing was made, May 12, the weather had turned cold and wet and continued so all through May and most of June, and in consequence the seed did not germinate well and the stand was very uneven. The growth was only fair when the cut-worms attacked the crop in July and nearly ruined it ; some varieties have made a fair crop, but the unfavourable spring and the cut-worms materially lessened the yield. Two sowings were made of each variety, and four rows each, one hundred feet long were sown in every case, and the yield computed from 66 feet of the two centre rows. The roots from both sowings were pulled October 23.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Yellow Intermediate	28	1,960	966	..	21	1,120	718	40
2	Giant Yellow Half Long	26	800	880	..	19	1,380	656	20
3	Half Long Sugar Rosy	22	1,760	762	40	18	80	601	20
4	Champion Yellow Globe	20	480	674	40	11	880	381	20
5	Mam. Yellow Intermediate	18	1,620	627	..	22	880	748	..
6	Norbiton Giant	18	960	616	..	15	1,460	524	20
7	Canadian Giant	18	740	612	20	20	1,580	693	..
8	Mam. Oval Shaped	18	80	601	20	17	1,640	594	..
9	Yellow Fleshed Tankard	18	80	601	20	13	400	440	..
10	Half Long Sugar White	16	560	542	40	12	640	410	40
11	Gate Post	16	120	535	20	14	600	476	40
12	Sutton's Prize Winner	15	800	513	20	14	1,920	498	40
13	Golden Fleshed Tankard	15	800	513	20	14	820	480	20
14	Yellow Intermediate	14	1,920	498	40	14	1,040	484	..
15	Prize Mammoth Long Red	14	1,040	484	..	17	1,200	586	40
16	Mammoth Long Red	14	1,040	484	..	12	640	410	40
17	Gate Post Yellow	14	820	480	20	13	180	436	20
18	Selected Mammoth Long Red	13	1,720	462	..	15	360	506	..
19	Wards Large Oval Shaped	13	1,720	462	..	11	1,760	396	..
20	Lion Yellow Intermediate	11	880	381	20	14	160	469	20
21	Giant Yellow Globe	10	240	337	20	11	440	374	..
22	Warden Orange Globe	9	1,580	326	20	10	1,340	355	40

EXPERIMENTS WITH CARROTS.

Nineteen varieties of carrots were tested this year. Two sowings of each sort were made, the first on April 4, the second on May 11. The land was similar in quality and preparation to that used for the mangels, and as the stand was even throughout, a heavy yield was expected, but the cut-worms attacked them and lowered the yield somewhat. Four rows of 100 feet long were sown of each variety at each sowing, and the yield computed from 66 feet of the two centre rows. The roots from both sowings were pulled on October 23.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant White Vosges	36	160	1,202	40	31	920	1,048	40
2	Improved Short White	35	400	1,173	20	29	740	979	..
3	Half Long White	33	....	1,100	..	27	120	902	.
4	New White Intermediate	31	480	1,041	20	24	400	806	40
5	Ontario Champion	30	1,660	1,026	40	35	400	1,173	20
6	Early Gem	28	1,200	953	20	23	1,520	792	..
7	Carter's Orange Giant	27	1,440	924	..	23	1,300	788	20
8	Mammoth White Intermediate	27	120	902	.	20	1,580	693	..
9	Green Top White Orthe	26	806	880	..	25	1,480	858	..
10	Guerande or Ox-Heart	26	800	880	..	23	420	773	40
11	White Belgian	25	600	843	20	23	640	777	20
12	Iverson's Champion	25	160	836	..	18	960	616	..
13	White Vosges Large Short	23	420	773	40	21	1,560	726	..
14	Half Long Chantenay	20	1,580	693	.	23	1,960	782	40
15	Giant Yellow Intermediate	20	1,360	672	40	16	780	546	20
16	Scarlet Intermediate	17	1,200	586	40	12	640	410	40
17	Scarlet Altringham	16	560	542	40	19	1,380	656	20
18	Scarlet Nantes	13	400	440	..	11	880	381	20
19	Long Orange or Surrey	13	400	440	..	11	660	377	40

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested this year. The soil had been ploughed in the fall of 1899, and given a dressing of stable manure which was well worked into the soil with the spade-harrow and drag. The first sowing was made April 23 and the second on May 10. The seed germinated very badly owing to the wet, cold weather, and the few plants there were up were injured so much by the cut-worms that the land was ploughed.

EXPERIMENTS WITH POTATOES.

Ninety-five varieties of potatoes were planted May 17 and 18, on a sandy loam that had a crop of clover turned under in the spring, and which was well prepared by repeated harrowings. The weather was so cold and wet for a long time after they were planted that the stand was very uneven and the growth feeble. Of some varieties not over one-half of the seed germinated, which is, in many cases, the cause of the poor crop. The yield has been calculated from the produce of two rows, 66 feet long, and average rows having been taken, a thin, uneven stand shows a poor result. The quality is, however, excellent, only a few varieties showing any rot.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Total Yield Per Acre.		Yield Per Acre of Sound.		Yield Per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	
1	Reading Giant	297	..	297	..	..	..	239	..	58	..	Long, white
2	Seedling No. 230	292	36	292	36	..	..	204	48	87	48	Round, white
3	Lizzie's Pride	292	36	292	36	..	..	234	..	58	36	Long, pink
4	Early Market	280	30	280	30	..	..	210	30	70	..	Oval, rose
5	Hale's Champion	268	24	268	24	..	..	201	24	67	..	Round, white
6	Prolific Rose	250	48	250	48	..	..	211	48	39	..	Long, rose
7	Quaker City	245	18	233	..	12	18	139	..	94	..	" white
8	Northern Spy	237	36	237	36	..	..	201	48	35	48	" red
9	Rose No. 9	235	24	235	24	..	..	211	34	23	50	" "
10	Uncle Sam	232	16	232	16	..	..	174	16	58	..	Oval, white
11	Dakota Red	232	16	232	16	..	..	209	..	23	16	Long, red
12	Rural Blush	232	16	232	16	..	..	185	46	46	30	" white
13	Pride of the Market	223	53	223	53	..	..	160	53	63	..	" "
14	Vanier	212	18	212	18	..	..	180	28	31	50	" red
15	McIntyre	212	8	212	8	..	..	169	35	42	33	" pink
16	Seattle	211	12	211	12	..	..	168	58	42	14	" white
17	Brownell's Winner	211	12	211	12	..	..	158	12	53	..	" red
18	Hopeful	209	..	209	..	..	..	166	30	42	30	Oval, white
19	Vigorosa	204	38	204	38	..	..	173	58	30	40	Rose
20	American Beauty	204	38	204	38	..	..	153	..	51	38	Long, white
21	Clay Rose	198	..	198	..	..	..	118	45	79	15	" rose
22	Swiss Snow Flake	197	17	197	17	..	..	138	6	59	11	" white
23	Carman No. 1	184	48	184	48	..	..	120	..	64	48	Oval, white
24	Houlton Rose	184	48	184	48	..	..	147	48	37	..	Long, rose
25	Bovee	180	24	170	54	9	30	140	54	30	..	" "
26	Green Mountain	180	24	170	24	10	..	153	..	17	24	Oval, white
27	Early Harvest	174	54	174	54	..	..	139	54	35	..	Long, "
28	Everett	173	48	173	48	..	..	130	18	43	30	" pink
29	Early Pride	173	48	173	48	..	..	113	..	60	48	White.
30	Irish Daisy	173	48	173	48	..	..	138	48	35	..	"
31	Great Divide	173	48	173	48	..	..	87	..	86	48	"
32	Early Six Weeks	171	36	171	36	..	..	86	36	85	..	Pink
33	Troy Seedling	171	36	171	36	..	..	126	12	45	24	Red
34	Ideal	169	24	135	24	34	..	101	..	34	24	Oval, pink
35	American Wonder	169	24	169	24	..	..	67	45	101	39	Long, white
36	Early Puritan	169	24	169	24	..	..	135	..	34	24	" "
37	Polaris	169	24	169	24	..	..	126	54	42	30	" "

AGASSIZ, B.C. BLACK WALNUT TREE, TWO YEARS OLD WHEN PLANTED IN SPRING OF 1890.

POTATOES—TEST OF VARIETIES—*Continued.*

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per acre of Market-able.		Yield per acre of Unmark-etable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
38	Sharpe's Seedling	168	18	168	18	..	..	117	48	50	30	Long, red
39	Penn Manor	167	12	167	12	..	..	125	12	42	..	" "
40	Country Gentleman	165	..	156	30	8	30	115	30	41	..	" pink
41	Seedling No. 7	165	..	165	..	..	..	132	..	33	..	" red
42	Livingston's Banner	165	..	156	..	9	..	100	20	55	40	" "
43	Lee's Favourite	162	48	162	48	..	..	97	24	65	24	" rose
44	Early St. George	158	24	158	24	..	..	95	..	63	24	" "
45	Early Rose	158	24	158	24	..	..	102	50	55	34	" "
46	Clarke's No. 1	158	..	158	..	..	..	108	..	50	..	Pink
47	Prize Taker	157	27	157	27	..	..	110	7	47	20	Red
48	Early Sunrise	157	27	157	27	..	..	125	27	32	..	Long, red
49	Irish Cobbler	156	54	148	54	8	00	109	54	39	..	White
50	Carman No. 3	156	12	156	12	..	..	117	..	39	..	Long, white
51	Maule's Thoroughbred	155	..	155	..	..	..	109	..	46	..	" rose
52	Ohio Junior	155	..	146	30	8	30	124	..	22	30	" "
53	Lopas White	155	..	155	.	..	..	93	.	62	..	Oval, white
54	State of Maine	154	..	154	..	..	..	92	24	61	36	
55	Bill Nye	153	27	153	27	..	..	112	..	41	27	White
56	Brown's Rot Proof	153	12	153	12	..	..	91	42	61	30	Long, red
57	Pearce's Extra Early	153	..	153	..	..	..	107	10	45	50	" rose
58	Rochester Rose	153	..	153	..	..	..	99	27	53	33	" "
59	Dreer's Standard	152	30	152	30	..	..	99	..	53	30	White
60	King of the Roses	152	30	152	30	..	..	106	45	45	45	Rose
61	Cambridge Russet	152	..	136	40	15	20	98	48	37	52	White
62	Delaware	152	..	143	30	8	30	107	30	36	..	"
63	Enormous	151	40	151	40	..	..	118	40	33	..	"
64	Money Maker	151	10	151	10	..	..	112	40	38	30	Long, white
65	Honeoye Rose	151	10	143	40	7	30	90	40	53	..	" rose
66	Rural No. 2	150	30	150	30	..	..	138	..	22	30	" white
67	Thorburn	150	30	150	30	..	..	119	30	31	..	Rose
68	Vick's Extra Early	150	15	150	15	..	..	118	45	31	30	Pink
69	Early Norther	150	15	134	40	15	35	90	..	44	40	Pink and white
70	Late Puritan	150	..	150	..	..	..	112	..	38	..	White
71	Reeve's Rose	148	30	148	30	..	..	89	..	59	30	Rose
72	White Beauty	148	30	148	30	..	..	89	..	59	30	White
73	Soudan	146	..	146	..	..	..	75	..	71	..	Russet.
74	Twentieth Century	146	..	146	..	..	..	98	40	47	20	
75	Chicago Market	145	30	145	30	..	..	114	30	31	..	Red
76	General Gordon	145	..	137	45	7	15	82	20	55	25	"
77	Sir Walter Raleigh	143	45	143	45	..	..	120	45	23	..	White
78	Flemish Beauty	143	45	143	45	..	..	100	30	43	15	Rose
79	Harvest King	142	30	134	40	7	50	85	30	57	10	
80	Beauty of Hebron	142	..	142	..	..	..	85	12	66	48	Rose
81	Wonder of the World	142	..	127	30	14	30	73	..	54	30	Pink
82	Earliest of All	141	45	126	45	15	..	85	..	41	45	White
83	Gem of Aroostook	143	..	143	..	..	..	84	30	58	30	Pink
84	Early Ohio	143	..	143	..	..	..	83	..	60	..	"
85	Pearce's Prize Winner	142	30	128	..	14	30	96	..	32	..	Rose
86	Seneca Beauty	142	30	135	30	7	30	74	30	61	..	"
87	Burnaby Seedling	142	..	126	..	16	..	62	..	62	..	"
88	Columbus	141	30	141	30	..	..	99	30	42	..	Pink
89	Holborn Abundance	141	..	141	..	..	..	105	30	35	30	White
90	American Giant	140	..	127	..	13	..	84	..	43	..	"
91	Daisy	140	..	140	..	..	..	75	..	65	.	Rose
92	I. X. L.	138	30	138	30	..	..	82	48	55	42	Pink
93	Burpee's Extra Early	138	..	138	..	..	..	82	..	56	..	Rose
94	Empire State	136	..	136	.	..	..	78	..	58	..	Pink and whi
95	New Variety, No. 1	131	30	117	45	13	45	67	..	50	45	White
96	New Queen	130	..	117	30	12	30	78	..	39	30	Pink
97	Maggie Murphy	127	..	121	..	6	..	63	30	58	30	Rose
98	Early White Prize	127	..	119	30	7	30	70	12	49	18	White

EXPERIMENTS WITH FODDER PLANTS.

The following fodder plants were tested again this year. The Japanese millet being a strong grower, and the stalks very leafy, was sown in drills 9 inches apart; all the others were sown in drills 7 inches apart. The soil was a warm loam, which had produced a crop of potatoes in 1899, and was in good condition. The weather was so wet when the crops were cut that they were put into the silo, it being impossible to cure them. The Japanese millet is the best and most valuable of this class of plants, so far tested here, being a strong grower with long heavy heads and the stalks are very leafy, and it is readily eaten by all kinds of stock.

The Soja bean is also a very valuable fodder plant.

All were sown May 15, and cut October 11.

MILLETS.

Plot 1—Japanese Millet :—
Length of stalk, 40 to 48 inches.
Length of head, 3½ to 8 inches.
Yield when cut green, per acre, 7 tons.

Plot 2—Golden Millet :—
Length of stalk, 26 to 30 inches.
Length of head, 2½ to 6 inches.
Weight when cut green, per acre, 5 tons 1,120 pounds.

Plot 3—Italian Millet :—
Length of stalk, 30 to 36 inches.
Length of head, 6 to 8 inches.
Weight per acre, cut green, 5 tons 1,600 pounds.

Plot 4—White Round Extra French :—
Length of stalk, 24 to 28 inches.
Length of head, 2½ to 3 inches.
Weight per acre, cut green, 3 tons 1,600 pounds.

Plot 5—Early Pearl :—
Length of stalk, 32 to 36 inches.
Length of head, 4 to 6 inches.
Weight per acre, cut green, 3 tons 1,440 pounds.

Plot 6—Pearl Millet :—
Length of stalk, 32 to 36 inches.
Length of head, 3½ to 6 inches.
Weight per acre, cut green, 4 tons 800 pounds.

Plot 7—Hungarian Grass :—
Length of stalk, 34 to 36 inches.
Length of head, 3 to 5 inches.
Weight per acre, cut green, 5 tons 120 pounds.

SOJA BEANS.

Three plots of this bean were sown in drills, one at 21 inches apart, one at 28 inches, and one at 35 inches.

The medium distance, or 28 inches, appears to be about right here, unless the land is very fertile, when it would be better drilled in at 35 inches apart. Being very leafy, if sown to suit the conditions of the soil, it soon shades the ground, and if kept clean of weeds up to that period of growth, there is very little trouble from this source until it is ready to cut. If cut when the bean is just full grown, it makes very rich feed. All were cut October 11.

Plot 1.—Sown May 1. Drills 21 inches apart. Length of stalks, 28 to 32 inches ; very leafy and with many pods. Weight when cut, 3 tons 360 pounds.

Plot 2.—Drills 28 inches apart. Sown May 1. Length of stalk, 28 to 34 inches ; fairly well podded. Weight when cut, 3 tons 1,440 pounds.

Plot 3.—Drills 35 inches apart. Sown May 1. Length of stalk, 28 to 34 inches ; fairly well podded. Weight when cut, 2 tons 1,540 pounds.

HORSE BEANS.

Plot 4—English Horse Beans.—Planted May 1, in drills 21 inches apart. Height of stalks, 28 to 32 inches. Yield per acre, 1 ton 880 pounds. A poor uneven stand, and the cut-worms injured them, cutting off the foliage and many of the blossoms.

Plot 5—Horse Beans.—Drills 28 inches apart. Planted May 1. Height 28 to 36 inches. Yield per acre, 1 ton 1,280 pounds.

Plot 6—Horse Beans.—Drills 35 inches apart. Planted May 1. Height of stalk, 30 to 36 inches. Yield per acre, 1 ton 1,440 pounds. All these horse beans suffered from the cut-worms.

SORGHUM.

Early Amber Sugar Cane.—Sown May 29, in drills 28 inches apart. The seed did not germinate, and the land was afterwards sown to mixed grains for fodder.

Early Orange Sugar Cane.—Sown same date as Early Amber, but like that variety it did not germinate. The land was afterwards ploughed and sown to other crop.

BROOM CORN.

Two plots of broom corn were sown in drills, one at 21 inches apart in the drill and the other at 28 inches, on June 1. The soil was a warm loam, but the continued rains during June prevented the germination of the seed. Only a few feeble plants came up and the land was afterwards ploughed and sown with other crops.

PASPALUM DILATATUM.

A small plot of this grass from Australia was sown May 31 with a nurse crop. It is at this date a fairly thick stand and looks promising

SAND VETCH.

A plot of this forage plant was sown May 11, on rich, well prepared loam, drilled in at the rate of 90 pounds of seed per acre. The seed germinated well and the plants made a fair growth, but the stalks are very slender and the leaves small, and when cured it is very light and like moss. The cattle did not care for it either green or cured.

	Tons.	Lbs.
Yield per acre, green....................	5	640
Yield per acre, cured	1	1,580

EXPERIMENTS WITH BUCKWHEAT.

Plots of one-tenth of an acre each of Silver Hull, Japanese and Grey buckwheat were sown May 19. All grew finely and were very promising, blooming profusely, and grain forming, when the cut-worms attacked them and in two days there was not a leaf or blossom left.

MIXED GRAINS FOR FEED.

Plots of a quarter of an acre each were sown with the following mixtures on May 11, and cut when the oats were in the early dough stage :—

Mixture No. 1.—One bushel each of oats, pease and barley.

Mixture No. 2.—One bushel each of oats, pease and wheat.

Mixture No. 3.—One bushel each of grass pea, oats and barley.

	Tons.	Lbs.
Mixture No. 1.—Yield per acre when cut.	8	320
Yield per acre when cured	3	1,560
Mixture No. 2.—Yield per acre when cut	7	1,880
Yield per acre when cured	3	1,120
Mixture No. 3.—Yield per acre when cut	7	1,440
Yield per acre when cured	3	1,360

EXPERIMENTS WITH GRASSES.

The plots sown with different varieties of Bromus in the spring of 1899, did not amount to very much this season. The wet spring which favoured other grasses and clovers did not appear to suit them.

As reported in 1899, Bromus Inermis made a thick sod last year, but many plants were dead this spring and clover came in, and the crop although a light one was more clover than Bromus Inermis.

Bromus Schraederi.—This grass was nearly all dead when growth began in spring and the crop cut off the plot was more than three-quarters clover.

Bromus giganteus.—This was very patchy, very few stools having come through the winter. Clover, however, came in freely and a small crop of hay was got from it.

Clover Seed inoculated with Nitragin.—One acre of clover was sown in the spring of 1899 with seed treated with nitragin, and ordinary seed clover was sown in the remainder of the field on three sides of it. Nitragin does not appear to add to the crop or be needed in the lower mainland of British Columbia. The yield of one acre of the first crop from the treated seed and one acre alongside of untreated were cut and weighed. The weather was so showery that no attempt was made to cure the clover, all was put into the silo.

	Tons.	Lbs.
Weight of 1 acre, untreated.	9	1,870
Weight of 1 acre, treated	9	1,980

The land where this crop grew is a gravelly loam, and as it has been in crop and cultivation for some years, it was all practically alike, and the comparison may be considered a fair one.

EXPERIMENT WITH CANARY SEED.

A plot of this seed was sown April 24. The seed did not germinate freely and the stand was thin and the crop poor.

Length of stalk, 24 to 30 inches ; length of head, 1 to 1¼ inches.

Cut August 27—Weight green, 1 ton, 160 pounds ; yield of seed per acre, 420 pounds.

EXPERIMENT WITH SPELTZ WHEAT.

An experimental plot of this grain was sown May 11. It grew vigorously and does not appear to be subject to either rust or smut. Ripe August 18.

Days to mature.	Length of straw. Inches.	Head.	Gross weight. tons.	lbs.	Grain. lbs.
99	48	2½	2	80	1,340

DISTRIBUTION OF SEED SAMPLES.

The following packages were distributed to applicants in the spring :—

Packages of trees and shrubs	280
Three-pound packages of wheat	41
" " oats	68
" " pease	73
" " barley	36
" " potatoes	284
Packages of tree seeds and nuts	83
Packages of bulbs	106

SUMMARY OF FORAGE CROPS HARVESTED.

	Tons.	Lbs
Clover hay	63	265
Mixed grains cured for hay	37	1,000
Clover ensilage	75	....
Corn ensilage	15	1,600
Turnips	18	1,700
Mangels	8	600
Carrots	9	325
Total	227	1,140

OATS TREATED WITH COMMERCIAL FERTILIZERS.

These plots were on a fairly strong clay loam that had produced a crop of pease in 1899, following clover, and evidently did not benefit much from the nitrate of soda. The dressing of superphosphate on plot No. 3 was a little too heavy, as the crop was badly lodged, and difficult to harvest. The muriate of potash did not have time to do as much good as it should have done, if it had been applied earlier in the season, but the straw on plot 5 was very stiff and bright, and the grain plump, as was that of plot 6, where a little dressing of each of the fertilizers was used. There was no rust or smut on any of the plots.

OATS—FERTILIZER TESTS.

Name of Variety.	Plot.	Quantity of Fertilizer used per Acre.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.	Tons.	Lbs.	Bush.	Lbs.	Lbs
Lincoln	1	100 lbs. nitrate of soda........	111	38	Medium..	8	2	1000	46	16	35
"	2	200 " "	113	40	Weak	8	3	800	60	00	$34\frac{3}{4}$
"	3	400 " superphosphate	113	48	Medium..	10	4	240	97	2	$35\frac{1}{2}$
"	4	No fertilizer	113	40	Weak... .	8	2	600	44	14	$34\frac{1}{2}$
"	5	200 lbs. muriate of potash...	113	42	Medium..	10	2	1800	53	8	$35\frac{3}{4}$
"	6	100 " mur. of pot., 100 lbs. nit. of soda, 200 lbs. superphos. .	113	46	Strong ...	10	3	1800	71	6	$36\frac{3}{4}$

FORMALIN AND MASSEL POWDER AS PREVENTIVES FOR SMUT.

One variety of oats and two varieties of barley were used in the tests with Formalin. The seed of each sort for five plots was treated with a solution of Formalin in different ways and of different strengths and the seed for the 6th plot was left untreated as a check plot.

The Massel powder test was used on one variety of oats only, the seed of which was used for plot No. 7. That for No. 8 was left untreated as a check plot. The seed used in each case was considerably affected with smut. The following results were obtained :—

OATS—TREATED FOR SMUT.

Number of Plot.	Name of Variety Sown.	Treatment.	Percentage of Good Heads.	Percentage of Smutty Heads.
1	Doncaster Prize. ...	Formalin $4\frac{1}{2}$ oz. to 10 galls. water; soaked 1 hour....	$21\frac{1}{2}$	$78\frac{1}{2}$
2	"	" " " 15 minutes.	20	78
3	" ...	" " " 5 "	20	80
4	"	" " " sprinkled	$23\frac{1}{2}$	$76\frac{1}{2}$
5	"	" 9 " " sprinkled......	21	79
6	" ...	Check plot ; untreated.........	$27\frac{1}{2}$	$72\frac{1}{2}$
7	Wide Awake........	Massed powder 4 oz., lime 2 lbs., water 2 galls. ; sprinkled	$10\frac{3}{4}$	$89\frac{1}{4}$
8	"	Check plot untreated	$26\frac{1}{2}$	$73\frac{1}{2}$

Barley—Treated for Smut.

Number of Plot.	Name of Variety Sown.	Treatment.	Percentage of Good Heads.	Percentage of Smutty Heads.
1	Odessa	Formalin $4\frac{1}{2}$ oz. to 10 galls. water; soaked 1 hour	$21\frac{1}{4}$	$87\frac{3}{4}$
2	"	" " " " 15 minutes	$11\frac{1}{2}$	$88\frac{1}{2}$
3	"	" " " " 5 "	12	88
4	"	" " " sprinkled	14	86
5	"	" 9 " " "	12	88
6	"	Check plot; untreated	18	82
7	Canadian Thorpe	Formalin $4\frac{1}{2}$ oz. to 10 galls. water, soaked 1 hour	13	87
8	"	" " " " 15 minutes	19	81
9	"	" " " " 5 "	$17\frac{1}{2}$	$82\frac{1}{2}$
10	"	" " " sprinkled	21	79
11	"	" 9 oz. " "	20	80
12	"	Check plot; untreated	25	75

FIELD BEANS.

Four varieties of beans were sown April 30, in drills 2 feet apart, on plots of one-fortieth acre each. The soil was a warm loam and the seed germinated well and, with the exception of the Mexican tree bean, were very promising until the cut-worm attacked them, cutting off the foliage and green pods, seriously damaging the crop.

Field Beans—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield per Acre. Bush.	Yield per Acre. Lbs.
White Marrowfat	April 30	Sept. 25	148	17	20
White Field Medium	" 30	" 28	151	19	
Mexican Tree	" 30	No pods formed.			
California Pea	" 30	Sept. 27	150	15	30

EXPERIMENTS WITH FLAX.

The experiments with flax were conducted on the same lines as those of last season. Eight plots were sown in sets of two each; one plot in each case being sown at the rate of 40 pounds per acre and the other at double that quantity, or 80 pounds per acre.

The first set was sown April 24 and the other sets following at intervals of a week each. The object being to gain information as to the best time to sow and the amount of seed to sow to get the best results. The land was fair in quality and in good condition. The crop was cut with a scythe and in consequence the gross weight is less than if it had been pulled.

Flax.	Pounds of Seed per acre.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Gross Weight of Straw and grain per acre.	Yield of Seed per Acre.	
					Inches.	Lbs.	Bush.	Lbs.
Plot 1	40	April 24....	August 9...	107	30 to 36	1,920	8	32
Plot 2	80	" 24....	" 9...	107	28 " 32	1,600	11	4
Plot 3	40	May 1....	" 13...	104	30 " 36	1,840	7	8
Plot 4	80	" 1...	" 13...	104	28 " 32	1,680	9	16
Plot 5	40	" 8....	" 18...	102	30 " 00	1,360	7	18
Plot 6	80	" 8....	" 18 ..	102	26 " 28	1,160	7	48
Plot 7	40	" 15 ...	" 21...	98	30 " 00	1,440	6	54
Plot 8	80	" 15...	" 21...	98	28 " 00	1,240	7	38

APPLES.

As the apple trees had almost, without exception, made a fine vigorous growth and borne very light crops in 1899, and the winter had been mild and favourable, a full crop was expected this year on all trees that had previously borne and a few on many trees of varieties which had not yet produced fruit. The old trees as well as many young ones bloomed profusely, but the cold north and north-west winds, cold rains and several light frosts prevented proper fertilization, consequently a large share of the bloom fell and the crop on the whole was very light and uneven. The continuous rains of April, May and June prevented the spraying mixtures having the proper effect, therefore, funguous diseases have been unusually prevalent, hence many scabby apples.

The following varieties fruited for the first time this year and some of them are promising in their season :—

Like all other fruits, apples are from two to three weeks earlier in ripening this year than usual and of inferior quality and appearance. The fruit dropped from the trees, in some cases, before it was fully matured.

Lebedka.—Tree a strong and vigorous grower. Fruit below medium size, roundish, conical ; skin greenish-yellow, with splashes of red on the sunny side. Flesh yellowish, juicy, slightly acid, quality poor. Season, last of July.

Gruschovka.—Tree a vigorous grower. Fruit of medium size, oblate, conical ; skin pale greenish-yellow with a few small red streaks. Flesh white, juicy, crisp, mildly acid, and pleasant. Season, early August.

Stone's Eureka.—Tree a vigorous grower. Fruit of medium size, oblate, conical ; skin greenish-yellow with patches of russet. Flesh white, juicy, crisp, mildly subacid and pleasant. Season, August.

Carmelite Reinette.—Tree a vigorous grower and early bearer. Fruit large, irregularly conical ; skin pale yellowish-green. Flesh tender, white, not juicy, nearly sweet. Season, early August.

Early Sweet.—Tree a vigorous grower. Fruit large, conical ; skin, yellow with a little russet about the stem. Flesh yellow, soft, sweet, not very juicy, but of very good flavour. Season, early August.

Kremer Glass.—Tree a strong grower. Fruit of medium size, globular ; skin clear, waxy, yellow, with many small patches of bright red on cheek. Flesh white ; a brisk acid, juicy, with a pleasant flavour. Season, August.

Frogmore Prolific.—Tree a vigorous grower. Fruit large, roundish, conical; skin greenish, with a dull red blush. Flesh firm, crisp, white, juicy, a little course, mildly acid. Season, early September.

Kentish Codlin.—Tree a strong grower, and early bearer. Fruit, large, oblong, conical, irregularly ribbed ; skin greenish-yellow. Flesh coarse, white, crisp, moderately juicy and acid. Season, September.

Prince Albert of Prussia.—Tree a vigorous grower, and early bearer. Fruit above medium size, flattish, globular ; skin greenish-yellow, nearly covered with bright red, and a little russet. Flesh greenish-white, crisp, juicy, subacid, of good flavour. Season, September.

Boskoop Calville.—Tree a strong and vigorous grower. Fruit below medium size, oblate, tapering to eye ; skin pale green, nearly covered with reddish-orange. Flesh yellowish, not juicy, mildly acid, of poor quality. Season, September.

Lyman's Seedling.—Tree a vigorous grower. Fruit above medium size, conical ; skin yellowish-green, with a bright red cheek. Flesh white, juicy, mildly acid, of poor quality. Season, September.

Ecklinville Seedling.—Tree a strong grower. Fruit very large, flat round ; skin green with a dull russet red cheek and sprinkled with russet dots. Flesh white, juicy, crisp, mildly acid, of fine flavour ; quality good. Season, September.

Langton's.—Tree a vigorous grower. Fruit medium size, globular ; skin green freely splashed with red. Flesh white, crisp, subacid, and of pleasant flavour. Season, September.

Okabena.—Tree a vigorous grower. Fruit of medium size, oblate ; skin greenish white, nearly covered with deep red. Flesh white, crisp, juicy, of a mild, pleasant subacid character. Season, September.

Kirkbridge.—Tree a medium grower. Fruit small, conical ; skin greenish white. Flesh white, mildly acid, juicy, with a pleasant flavour. Season, September.

Golden Merienwerder.—Tree a strong grower. Fruit medium to large, oblong, slightly ribbed ; skin greenish-yellow. Flesh white, juicy, crisp, subacid. Season, September.

Dantzic Kant.—Tree a strong grower. Fruit above medium size, roundish, irregular ; skin green splashed with reddish-bronze and a little russet. Flesh white, crisp, juicy, subacid, with a pleasant flavour. Season, September.

Walworth Pippin.—Tree a strong grower. Fruit large, roundish, irregularly tapering ; skin yellowish green, with dull reddish cheek and freely sprinkled with small white dots. Flesh white, crisp, juicy, subacid. Season, September.

Voronesh Reinette.—Tree a vigorous grower. Fruit large, roundish conical ; skin yellowish-white, with a deep red blush nearly over the whole surface. Flesh white, juicy, of a mild, pleasant acid character. Season, September.

Charlemoff.—Tree a strong grower. Fruit of medium size, globular, slightly tapering to eye ; skin greenish-yellow, freely splashed with two shades of red. Flesh white, not juicy, firm, subacid. Season, September.

Aport, 252.—Tree a strong grower. Fruit large, oblong, globular ; skin clear yellow. Flesh white, crisp, juicy, slightly acid, with a pleasant flavour. Season, September.

Knevskoe.—Tree a vigorous grower. Fruit of medium size, irregular globe-shape; skin yellowish-white, with a faint blush on sunny side. Flesh white, moderately juicy, crisp, subacid. Season, September.

Kursk Reinette.—Tree a medium grower. Fruit large, oblong, of an irregular shape ; skin green, nearly covered with russet. Flesh white, crisp, juicy, a little coarse, inclined to water core. Season, September.

Summer Pearmain.—Tree a strong grower. Fruit small, oblong, tapering ; skin dull green with a dark red blush. Flesh greenish-white, firm, not juicy, of poor quality. Season, September.

Duchovoe.—Tree a strong upright grower. Fruit large, oblong; skin light yellow, freely splashed and mottled with light and dark red. Flesh crisp, juicy, white, a little coarse, pleasantly subacid. Season, early September.

Voronesh No. 9.—Tree a medium grower. Fruit above medium size, globular conical, somewhat ribbed. Skin greenish-yellow, with a little pale red on cheek. Flesh white, crisp, rather coarse, juicy, pleasantly subacid. Season, September.

Golden White.—Tree a strong grower. Fruit large, globular tapering to eye. Skin greenish-yellow, with a little red on cheek. Flesh white, crisp, not juicy, of a mild, pleasant acid character. Season, September.

Simbirsk No. 10.—Tree vigorous and productive. Fruit of medium size, roundish conical. Skin yellow, freely splashed and striped with bright red. Flesh yellowish, crisp, not juicy, subacid with a pleasant flavour. Season, September.

Cox's Pomona.—Tree a medium grower. Fruit large oblate, slightly tapering to eye, ribbed. Skin yellowish, striped and splashed with red in two shades. Flesh coarse white, juicy subacid. Season, September.

Queter.—Tree a strong grower. Fruit of medium size, oblate. Skin greenish-white with a faint blush and a little russet about the stem. Flesh a little coarse, white, not juicy, subacid. Quality, poor. Season, early October.

Sklanka.—Tree a vigorous grower. Fruit above medium size, conical. Skin green with a faint blush in the sun. Flesh white, crisp, juicy, mildly subacid. Season, October.

Stone Antonovka.—Tree a medium grower. Fruit large, oblong conical. Skin greenish-yellow. Flesh yellowish white, crisp, juicy, pleasantly subacid. Season, October.

Tyrrestrup.—Tree a vigorous grower. Fruit large, oblong globe-shaped. Skin green with sometimes a faint blush. Flesh white, juicy, pleasantly subacid. Season, October.

Harbert's Reinette.—Tree a strong grower. Fruit above medium size, roundish conical. Skin greenish-yellow, splashed with russet. Flesh white, crisp, juicy, mildly acid, with a pleasant flavour. Season, October.

Cross Voronesh.—Tree a strong grower. Fruit of medium size, oblong, globular, irregularly ribbed. Skin greenish-white with patches of russet. Flesh white, crisp, coarse, mildly acid, of medium quality. Season, October.

No. 569.—Tree a vigorous grower. Fruit above medium size, oblong, slightly conical, ribbed. Skin green with a dull red cheek. Flesh white, juicy, mildly acid with a pleasant flavour. Season, October.

Romenskoe.—Tree a vigorous grower. Fruit large oblate, tapering a little to the eye, irregular in shape. Skin greenish-yellow with a red cheek. Flesh white, crisp, moderately juicy, of a pleasant subacid character. Season, October.

Garfield.—Tree a strong grower. Fruit of medium size, globular, conical. Skin yellowish-green, with an orange-reddish cheek. Flesh white, juicy, subacid, firm, with a pleasant flavour. Season, October.

Belmont.—Tree a medium grower. Fruit above medium size, roundish, conical. Skin greenish-yellow with a faint blush. Flesh white, crisp, subacid, with a pleasant flavour. Season, November and December.

Owen Jones.—Tree a strong grower and early bearer. Fruit above medium size, roundish oblong, tapering slightly to the eye. Skin dull green, freely splashed with dull red. Flesh yellow, firm, moderately juicy, of medium quality. Season, November and December.

Hare Pipka.—Tree a vigorous grower. Fruit of medium to large size, globular. Skin, greenish-yellow, with a dull red blush. Flesh white, crisp, juicy, subacid. Season, November.

Ragan's Yellow.—Tree a strong grower. Fruit of medium size, roundish conical. Skin greenish-yellow, with splashes of russet and a dull orange cheek. Flesh yellowish, firm, moderately juicy, pleasant, subacid, quality good. Season, November.

Lady Elgin.—Tree a strong grower. Fruit of medium size, roundish, flat. Skin green, with a little russet and a bronze cheek, smooth and clean. Flesh white, crisp, juicy subacid. Season, December and January.

Hebble White.—Tree a vigorous grower. Fruit of medium size, oblate. Skin green, nearly covered with russet. Flesh greenish-white, crisp, moderately juicy, with a pleasant flavour. Season, winter.

Oxford Peach.—Tree a strong grower. Fruit below medium size, roundish, slightly conical. Skin green, with a dull red cheek. Flesh yellowish, crisp, pleasantly subacid. Season, winter.

Colfax.—Tree a vigorous grower. Fruit large, roundish, conical. Skin yellow, nearly covered with light red splashed and mottled with crimson. Flesh white, juicy, crisp, subacid, with a pleasant flavour. Season, early winter.

McEwen's Sweet.—Tree a free grower. Fruit small to medium size, oblong. Skin yellow, with grayish dots. Flesh white, crisp, juicy, with a pleasant flavour, sweet. Season, November to January.

Red Aberdeen.—Tree a strong grower. Fruit of medium size, conical. Skin greenish-yellow, almost covered with deep red. Flesh white, crisp, juicy, mildly acid, with a pleasant flavour. Season, winter.

Heatherbell.—Tree a strong grower. Fruit of medium size, roundish, oblate. Skin greenish-yellow, with a splashed and striped blush. Flesh crisp, white, juicy, with a sprightly pleasant flavour. Season, winter.

Clayton.—Tree a medium grower. Fruit below medium size, oblate. Skin green, with a reddish blush, rather scabby. Flesh white, not juicy, quality fair. Season, winter.

Gano.—Tree a strong grower. Fruit above medium size, broadly conical. Skin green, nearly covered with a dull red. Flesh white, firm, moderately juicy, mildly subacid. Season, winter.

Crown Prince Rudolph of Austria.—Tree a strong grower. Fruit above medium size, oblate. Skin russet green, nearly covered with dull red. Flesh yellowish, firm, moderately juicy, of a pleasant subacid character. Quality, good. Season, October.

Ozark.—Tree a medium grower. Fruit of medium size, oblong globular. Skin greenish-russet with a dull reddish cheek. Flesh greenish-white, firm, not very juicy, mildly subacid. Season, winter.

Alant.—Tree a strong grower. Fruit of medium size, oblong, tapering to the eye. Skin green with a few splashes of dull red. Flesh crisp, juicy, of a mild, pleasant acid character. Season, winter.

Beauty of Pontoise.—Tree a vigorous grower. Fruit large, roundish oblate and sometimes ribbed. Skin green, sprinkled with small whitish dots and splashed with dull red. Flesh whitish, crisp, juicy pleasantly subacid. Season, winter.

Striefling.—Tree a vigorous grower. Fruit small to medium in size, globular. Skin green, nearly covered with stripes and splashes of two shades of red. Flesh white, crisp, juicy, with a pleasant flavour. Season, winter.

Zuccalmaglio's Reinette.—Tree a strong grower. Fruit of medium size, oblong, tapering a little to the eye. Skin green, freely sprinkled with small white dots and with a faint pink blush on sunny side. Flesh white, firm, juicy, subacid. Season, winter.

Minister.—Tree a strong grower. Fruit below medium size, globular. Skin green, nearly covered with small splashes and stripes of red. Flesh juicy, firm, white. Season, winter.

Tuft's Baldwin.—Tree a strong grower. Fruit large, globular. Skin nearly covered with dull red and many white dots. Flesh yellowish-white, crisp, mildly subacid with a pleasant flavour. Season, early winter.

Gaesdonker Gold Reinette.—Tree a vigorous grower and an early bearer. Fruit of medium size, globular, somewhat oblique. Skin greenish-yellow, with a dull red cheek, sprinkled with gray dots. Flesh whitish, moderately juicy, crisp, mildly acid, with a pleasant flavour. Free from scab. Season, winter.

Bohemian Favourite.—Tree a medium grower. Fruit of medium size, oblong conical. Skin smooth, yellowish white, with a bright red cheek. Flesh white, juicy, crisp, nearly sweet, with a pleasant flavour. Season, winter.

English Winter Calville.—Tree a medium grower. Fruit of medium or below medium size, globular. Skin smooth, clean, greenish-yellow, with a dull red cheek. Flesh, white, moderately juicy, crisp, mildly acid, with a pleasant flavour. Season, winter.

Berk's Reinette.—Tree a strong grower and early bearer. Fruit small and inclined to be scabby. Skin yellow, sprinkled with gray dots and with a red cheek. Flesh white, moderately juicy, crisp, mildly subacid, with a pleasant flavour. Season, winter.

Steward's Golden.—Tree a medium grower. Fruit of medium size, oblate. Skin smooth, greenish-yellow, with a dull red cheek. Flesh white, crisp, juicy, of a mild pleasant acid character. Season, winter.

Reinette Ananas.—Tree a strong grower and an early bearer. Fruit of medium size, globular, tapering a little to the eye. Skin yellow, freely sprinkled with small green dots. Flesh white, crisp, juicy, pleasantly subacid ; quality, good. Season, winter.

Lincolnshire Red Coat.—Tree a strong grower and an early bearer. Fruit large, conical. Skin greenish-yellow, with a bright red cheek, and a little russet near the stem and a few gray dots. Flesh white, crisp, juicy, sweet, of fine flavour. Season, winter.

Lichtenwalder.—Tree a strong grower. Fruit of medium size, globular. Skin greenish-yellow, with a bronze-reddish cheek. Flesh greenish-yellow, firm, crisp, moderately juicy of a pleasant, mild acid character. Season, winter.

Kossuth.—Tree a medium grower. Fruit small, oblate. Skin russet green, sprinkled with gray dots and with a bronze cheek. Flesh white, firm, moderately juicy, aromatic, of a mild, pleasant acid character. Season, winter.

London Pippin.—Tree a strong grower and an early bearer. Fruit of medium size, rather flat, irregular. Skin clear yellow, with a dark red blush on the sunny side. Flesh yellow, juicy, crisp, pleasantly acid. Season, winter.

Red Stettin.—Tree a vigorous grower and an early bearer. Fruit large, oblate, ribbed. Skin greenish-yellow, with a dull red cheek. Flesh greenish-yellow, firm, not very juicy, pleasantly subacid. Season, winter.

Pound Sweet.—Tree a strong grower. Fruit large, oblong, ribbed. Skin greenish-yellow, with a little red on sunny side. Flesh greenish-white, not very juicy, sweet. Season, winter.

Marshall's Seedling.—Tree a vigorous grower and an early bearer. Fruit above medium size, conical. Skin yellowish-white, with a few gray dots and a pinkish blush. Flesh white, firm, crisp, juicy, pleasantly subacid. Season, winter.

Fraser River Beauty.—This variety is in every respect identical with Striped Astrachan and should be dropped off the list.

Williams' Early.—This variety is identical in growth of tree, appearance of fruit, time of ripening and quality with the Yellow Transparent, and the name Williams' Early may also be dropped off the list.

PEARS.

All of the older or longest planted pear trees bloomed freely this year, but very few set fruit. The Bartlett, Keiffer, Dr. Jules Guyot, Rivers Princess and Vicar of Winkfield, gave fair crops, but very few of the other trees gave more than a dozen or two of inferior samples.

The following varieties fruited for the first time this year:—

Early Duchess.—Tree a strong grower and an early bearer. Fruit above medium size, obtuse pyriform; skin greeish-yellow, with a bronze reddish cheek and a few gray dots. Flesh coarse, not juicy, sweet, with a pleasant flavour. Season, early September.

Beurre Six.—Tree a vigorous grower, and an early bearer. Fruit small, pyriform; skin pale yellow with a few green dots. Flesh whitish, juicy, melting, vinous. Season, September.

René Dunan.—Tree a strong grower. Fruit large, obtuse pyriform; skin yellowish green, sprinkled with gray dots and splashed with russet. Flesh a little coarse, whitish, juicy, sweet, with a pleasant flavour. Season, late September.

Hohensaten.—Tree a medium grower. Fruit of medium size, obtuse pyriform; skin yellow, with a faint blush, and freely sprinkled with gray dots. Flesh white, juicy, buttery, nearly sweet, of very fine flavour. Season, late September.

Epine d'Eté.—Tree a medium grower. Fruit of medium size pyriform; skin pale yellow. Flesh tender, sweet, musky. Season, September.

Frederick Clapp.—Tree a vigorous and spreading grower. Fruit of medium size, roundish pyriform; skin smooth yellow, with a few brown dots. Flesh yellowish, juicy, with a rich fine flavour. Season. October.

Douillard.—Tree a medium grower. Fruit large, obovate, obtuse, pyriform; skin pale yellow, traced with russet. Flesh white, fine-grained, juicy, slightly vinous. Season, October.

Cole's Seedless.—Tree a strong grower. Fruit small to medium, obtuse, pyriform; skin yellow with patches of russet and a few brown dots. Flesh fine-grained, whitish, juicy, sweet and pleasant. Season, October.

Brockworth Park.—Tree a medium grower. Fruit above medium size, obtuse, pyriform; skin smooth, pale yellow with a faint blush. Flesh white, juicy, buttery, vinous, rich. Season, last of October.

Garber.—Tree a strong grower and productive. Fruit of medium size, obtuse pyriform; skin greenish yellow, with gray dots, very similar to Keiffer in quality and season.

Lucy Duke.—Tree a moderate grower. Fruit large, pyriform; skin a reddish russet. Flesh whitish, juicy, sweet and pleasant. Season, October.

Hoosie.—Tree a vigorous grower. Fruit large roundish, pyriform; skin clear yellow, with a little russet and sprinkled with russet dots. Flesh whitish, juicy, melting rich aromatic, quality good. Season, October.

Jones' Seedling.—Tree a vigorous grower. Fruit below medium size, pyriform; skin deep yellow, with russet patches and a few dots. Flesh granular, sugary, vinous. Season, October.

Soldat Laboreur.—Tree a medium grower. Fruit of medium size, roundish, pyriform; skin yellow, with patches and dots of russet. Flesh yellowish, granular, moderately juicy, sweet and perfumed; quality good. Season, October.

Figue d'Alençon.—Tree a strong grower. Fruit above medium size, oblong, pyriform ; skin greenish-yellow, with a brownish red cheek, and many russet dots. Flesh greenish-white, juicy, melting, sweet, slightly vinous. Season, October and November.

Forelle.—Tree a strong grower. Fruit small to medium, obovate, pyriform ; skin yellow, with a red cheek and a few crimson dots. Flesh white, fine grained, buttery, slightly vinous; quality good. Season, November.

Reeder.—Tree a vigorous grower. Fruit small, pyriform; skin yellow, with patches of russet, and many russet dots. Flesh whitish, fine grained, juicy, melting, sweet and pleasant, perfumed. Season, November.

Louise Vilmorin.—Tree a strong grower, and an early bearer. Fruit of medium size, obtuse, pyriform; skin yellow with considerable russet and many russet dots, and a dull red cheek. Flesh white, fine grained, juicy, melting and sweet; quality good. Season, November.

Beurre d'Aremberg.—Tree a moderate grower. Fruit of medium size, obovate; skin pale greenish-yellow, with tracings and spots of russet. Flesh white, buttery, juicy, with a rich vinous flavour. Season, November.

Beurre Rance.—Tree a medium grower. Fruit of medium size, obtuse, pyriform; skin dull green, dotted with many russet dots. Flesh greenish-white, melting, juicy and rich; quality good. Season, December.

P. Barry.—Tree a strong grower. Fruit large, long pyriform, slightly obtuse; skin deep yellow, nearly covered with golden russet. Flesh whitish, fine-grained, juicy, melting, sweet and of fine quality. Season, December.

Marie Benoist.—Tree a moderate grower. Fruit large, obtuse, pyriform; skin dull yellow, nearly covered with russet. Season, December.

Bergamot d'Esperen.—Tree a vigorous grower. Fruit of medium size, oblate, globular ; skin greenish-yellow, with patches of russet and many russet dots. Flesh greenish-yellow, juicy, buttery, sweet ; quality, very good. Season, December.

Dana's Hovey.—Tree a vigorous grower. Fruit small, obovate, obtuse, pyriform ; skin pale yellow, with small patches of russet and many russet dots. Flesh yellowish, juicy, fine grained, with a rich sweet flavour. Season, December.

Prevost.—Tree a vigorous grower. Fruit of medium size, obovate, pyriform ; skin pale yellow, with a faint blush in the sun and sprinkled with small brown dots. Flesh white, juicy, a little coarse, but sweet and of a pleasant flavour. Season, winter.

PLUMS.

The plum trees commenced to blossom early in March this year, and those that were in bloom very early were caught by the frosts that occurred occasionally, from the first up to the end of that month. The Japan plums are the greatest sufferers, as they bloom very early, and even if there is no frost, the weather which is frequently wet and cold, appears to prevent the fertilization of the blossoms. Very seldom has there been more than a very light crop of these varieties, while the trees make a healthy growth, and are very profuse bloomers. The few plums they do bear are as a rule very irregular in size, ranging from very small up to very large.

The plum rot was very generally prevalent, and the orchard at Agassiz suffered rather severely, only a few varieties being entirely or nearly exempt from the disease. The following are some of the most promising of the rot-resisting class, these being either entirely free or very nearly free from it. Belgian Purple, Diamond, Goliath, Sultan, Mallard, Lincoln, Cochet, Clyman, Grand Duke and Monarch.

The following varieties fruited this year for the first time :—

Diaprée Violette (—Cheston).—Tree a vigorous grower. Fruit small, oblong; skin dark purple with a bluish bloom. Flesh yellow, firm, sweet, and of good flavour ; freestone. Season, early August.

Tatge.—Tree a strong grower, and free bearer. Fruit of medium size, oval, a little flattened at each end ; skin purple red, with a thin whitish bloom. Flesh yellow, juicy, with a pleasant flavour, moderately sweet. Season, early August.

Prince's Red Gage.—Tree a vigorous grower, and a free producer. Fruit below medium size ; skin dark red, with a thin bloom. Flesh greenish, juicy, tender, sweet, with a high flavour. Season, early August.

Blue Apricot.—Tree a strong grower. Fruit above medium size, globular ; skin reddish purple, with many golden dots, and a thick blue bloom. Flesh yellowish green ; firm, moderately juicy, sweet, and of fine flavour; stone small and free. Season, early August.

Early Tours.—Tree a vigorous, but slender grower. Fruit of medium size, oval ; skin deep purple, with a thick bloom. Flesh greenish yellow, juicy, sweet, with a pleasant flavour. Season, early August.

Royal Tours.—Tree a strong grower. Fruit above medium size, globular, with a deep suture and one side enlarged ; skin dull red, with a sprinkling of golden dots, and a thick bloom. Flesh greenish, juicy, with a pleasant flavour. Season, early August.

Norbert.—Tree a vigorous grower. Fruit small, flattish globular ; skin dark purple with a thick light blue bloom. Flesh yellowish-green ; firm, sweet, with a pleasant flavour. Season, August.

Throop, No. 1.—Tree a strong grower. Fruit large, oblong, largest in the middle, and tapering to each end, with a wide suture ; skin reddish-pink, with a whitish bloom. Flesh yellowish, juicy, sweet, with a fine flavour; free-stone. Season, August.

Bullman.—Tree a vigorous grower. Fruit above medium size, oval, with a deep suture, and one side enlarged ; skin greenish-yellow, sprinkled with small clear red dots. Flesh greenish-yellow, juicy, sweet, with a pleasant flavour; free-stone. Season, August.

Mirabelle Double.—Tree a strong grower. Fruit below medium size, roundish, flattened, skin clear, yellow with a few small bright red dots. Flesh yellow, very sweet, and rich ; stone free. Season, August.

Guthrie's Topaz.—Tree a strong grower. Fruit of medium size, with a slight neck, and one side enlarged ; skin golden yellow, with thin bloom. Flesh yellow, juicy, sweet ; cling-stone. Season, August.

Mason.—Tree a vigorous grower. Fruit small to medium ; heart-shaped ; skin yellowish red. Flesh tender, not juicy ; pleasant and sweet ; cling-stone. Season, last of August.

Caddo Chief.—Tree a vigorous grower. Fruit of medium size, oval, with a deep suture, one side enlarged; skin yellowish, with a white bloom. Flesh yellowish, not juicy, sweet, with a pleasant flavour ; cling-stone. Season, last of August.

Chabot.—Tree a vigorous grower. Fruit of medium size, roundish ; skin red. Flesh yellowish, not juicy, moderately sweet, with a pleasant flavour. Season, last of August.

Bijonnier.—Tree a vigorous grower. Fruit small, oval, with a broad suture; skin pale yellow, with a thin bloom. Flesh greenish-yellow, sweet and juicy, with a pleasant flavour ; free-stone. Season, last of August.

Boddaert's Reine Claude.—Tree a vigorous grower. Fruit above medium size, roundish oblong. Skin pale greenish-yellow, mottled, with patches of green. Flesh whitish-yellow, juicy and sweet, with a pleasant flavour. Season, last of August.

White Honey Damson.—Tree a vigorous grower. Fruit small, oval. Skin pale yellowish-white. Flesh yellowish-white, juicy, and sweet, with a pleasant flavour. Season, early September.

Rangheri's Mirabelle.—Tree a vigorous grower. Fruit below medium size, roundish, with a shallow suture. Skin pale yellow. Flesh yellow, juicy, sweet, with a rich flavour ; free-stone. Season, early September.

Jerusalem.—Tree a stronger grower. Fruit above medium size, oblong egg-shaped. Skin dark purple, with a thick blue bloom. Flesh firm, sweet, moderately juicy, with a pleasant flavour ; free-stone. Early September.

Queen of Mirabelles.—Tree a strong grower. Fruit small globular. Skin yellow, with a thin whitish bloom, and a few reddish dots and spots near the stem. Flesh yellowish, juicy, and sweet, with a pleasant flavour ; cling-stone. Season, last of September.

Giant Prune.—Tree a vigorous grower and fruit bearer. Fruit above medium size, oblong oval. Skin light reddish purple, with a thin bloom. Flesh yellow, medium juicy and sweet, with a pleasant flavour ; stone not quite free. Season, September.

Stanton.—Tree a vigorous grower. Fruit medium size, oval. Skin dark purple, with a reddish bloom. Flesh yellowish green, sweet and juicy, with fine flavour. Season, September.

Golden Beauty.—Tree a free grower but a poor bearer. Fruit small, heart-shaped. Skin golden red. Flesh deep orange, not very juicy, flavour pleasant. Season, Sept-tember.

CHERRIES.

The cherry trees bloomed very profusely in the spring, set fruit well and gave promise of an abundant crop. When the fruit was about half grown, it was expected the crop would aggregate nearly, if not quite, one and a half tons, but when the earlier sorts began to colour rot attacked them and the continuous rains favoured the rapid development of the disease, so that trees which promised a fine crop produced very little merchantable fruit. The following varieties fruited for the first time this year:—

Willis' Early.—Tree a strong and vigorous grower. Fruit of medium size, obtuse, heart-shaped. Skin yellow, mottled with light red and a few golden dots. Flesh yellowish-white, juicy, tender and sweet. Ripe early in May.

Kassin's Early.—Tree a vigorous grower. Fruit of medium size, roundish heart-shaped. Skin dark glossy red. Flesh and juice deep red. Flesh firm, juicy and sweet, with a pleasant flavour. Ripe middle of May.

Crown Prince.—Tree a strong grower. Fruit above medium size or nearly large heart-shaped. Skin yellow, with a light red blush. Flesh whitish, juicy, tender, refreshing. Quality, good. Ripe last of May.

Duchess of Angoulème.—Tree a strong grower. Fruit small, round. Skin dark, glossy red. Flesh yellow, tender, juicy and with a sprightly pleasant flavour. Ripe early in June.

Werder's Early Black Heart.—Tree a vigorous grower. Fruit large, roundish, heart-shaped. Skin black. Flesh dark red, tender, juicy, sweet and good. Ripe early in June.

Ox-Heart.—Tree a vigorous grower. Fruit large, obtuse, heart-shaped. Skin dark red. Flesh tender and juicy, with a pleasant flavour. Ripe early in June.

Spanish Black.—Tree a vigorous grower. Fruit of medium size ; heart-shaped, irregular. Skin dark, glossy, purple. Flesh dark red, tender, juicy, rich and sweet. Ripe middle of June.

Von der Natte.—Tree a vigorous grower. Fruit medium to large, roundish. Skin glossy red. Flesh red, juicy, sprightly and of pleasant flavour. Ripe late in June.

Gros Gobet.—Tree a feeble grower. Fruit above medium size, round and flattened at top and base. Skin bright, glossy red. Flesh yellowish, juicy, slightly acid. Ripe late in June.

Tradescant's Black Heart.—Tree a vigorous grower. Fruit large, heart-shaped, with an irregular surface. Skin, glossy black. Flesh firm, moderately juicy, dark red, with a pleasant flavour. Quality good. Ripe late in June.

PEACHES.

The peach crop was, with the exception of the Amsden June, almost an entire failure this year. The trees were carefully sprayed with Bordeaux mixture before the buds opened and again twice after the blossoms fell, they were, nevertheless, very badly affected with the curl leaf. The constant rains continuing throughout the spring and early summer was favourable for the development of fungous diseases, and most of the peach and nectarine trees were ruined by the curl leaf, as the foliage fell and new leaves formed they in turn became diseased and fell off.

NECTARINES.

These were even greater sufferers than the peach trees. They have never borne any large crops, a few specimens of poor fruit being the most they have ever produced.

APRICOTS.

The Acme apricot is the only variety among those tried here that has ever borne more than a few specimens. It is a fairly good apricot and has borne three small crops, but the tree is tender, large limbs dying from time to time, and this year the whole tree died. Nearly all the other varieties of this fruit were affected in the same way, although they did not bear fruit, and quite a collection of seedlings which grew well for a year or two have died piecemeal. The peach, apricot and nectarine are not adapted to exposed locations in this locality.

MEDLARS.

All the varieties of this fruit, seven in all, fruited this year. The bloom does not open until late, generally well on in May, and escapes frost and always sets its fruit. Since these trees began fruiting none of them have missed a crop. The variety called Giant is the largest fruited, and the Nottingham the smallest, but the difference is not great, and in other respects there is not much to choose in the quality or merits of the different sorts.

QUINCES.

None of the quinces bore fruit this year. Several of the trees blossomed and look healthy, but they do not set fruit.

MULBERRIES.

All of the named varieties of the mulberries fruited freely this year, as they always do. Several seedling trees have grown to a considerable size, but have not borne any fruit. This fruit does not appear to have any insect or fungous enemies. It is too soft for shipment, but is pleasant to eat off the tree, and is used in a number of ways, and as the fruit commences to ripen early in July and continues to the last of September, a tree or two are a useful addition to the home supply of fruit. As tested here there is not much choice between Downing, Hicks, or New American, all are meritorious.

GRAPES.

The grapes this year have been almost a total failure. A few varieties fruited, but in every case the bunches were open, many of the berries small and very many of them had been cut into or holes gouged in the skin by the cut-worms. Those sorts which produced a few clusters of ripe berries, ripened in the order named, Jessica, Saunders' No. 4, Delaware, Moyer.

GOOSEBERRIES.

The gooseberry bushes were sprayed with Bordeaux mixture early in the spring before the buds opened, again just after the leaves began to form and after blooming, and once again later in the spring, but perhaps partly owing to the frequent showers which so often wash the mixture off before it has time to effect the purpose for which it is applied, or from some other cause, mildew was not subdued this season.

The few bushes planted on the upper bench lands are practically free of the disease, and have never been sprayed.

STRAWBERRIES.

The strawberry crop has not been quite as good this year as usual. Twice during the winter the plants were badly heaved by frost which came immediately after heavy rain when the soil was filled with water. Then during the blossoming period there was light frost and a deal of cold rain which prevented the fertilizing of the flowers, and heavy continuous rains during the ripening injured the crop.

STRAWBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Berry.	Quality.	Productiveness.
Arrow	June 2	Vigorous ...	Medium......	Firm; long thimble shaped; glossy red; a little acid; good flavour.	Productive.
Dayton . ..	" 2	" ...	Large medium	Firm, deep red, sweet, good flavour.	"
Chairs	" 2	" ...	" .	Firm; sweet, good flavour....	"
Omega	" 3	" ...	" .	Firm; berry conical bright red; sweet, good flavour; one of the best.	"
Weston........	" 3	Moderately vigorous.	Small	Fairly firm; conical dark red; a little acid; fair flavour.	Moderately productive.
Tennessee Prolific.	" 4	Vigorous ...	Large	Firm; long conical bright glossy red; a little acid; good flavour.	Productive.
Anna Kennedy.	" 4	" ...	Large medium	Firm; roundish conical, glossy red; sweet, good flavour.	"
Bissel	" 4	" ...	Very large....	Rather soft; irregular in shape; bright red; good flavour.	"
H. W. Becher..	" 4	" ...	Large	Firm; light red; sweet, good flavour.	"
Eleanor.	" 5	Moderately vigorous.	Small	Moderately firm; round, dark red; sweet, fine flavour.	Moderately productive.
Iowa Beauty...	" 5	Vigorous ...	Large	Firm; very good quality......	Productive.
Van Deman ...	" 5	" ...	Large medium	Firm, conical, dark red; a little acid; good flavour.	"
Maxwell.	" 5	" ...	Medium......	Firm, round conical, bright red; sweet, good flavour.	"
Greenville	" 5	" ...	Large medium	Firm, round, bright red; even size; very good.	"
Alpha.........	" 5	Moderately vigorous.	" .	Firm; of fairly good quality..	Moderately productive.
Mary..........	" 5	Vigorous ...	" .	Firm, clear pale red; sweet, good flavour.	" ..
Timbrell.......	" 6	" ...	Medium......	Firm; good quality.........	Not productive.
Empress Eugenie.	" 6	Moderately vigorous.	"	Firm; sweet, good flavour....	Moderately productive.
Bonny Lass....	" 6	" ..	"	Firm; sweet, good flavour....	" ..
Warfield.......	" 6	Vigorous ...	"	Firm, dark red, sweet; very good quality.	Productive.
Crockett's Choice.	" 6	" ...	Small	Firm, long, conical, dark red, juicy; sweet, fine flavour.	Not productive.
Brandywine....	" 7	Moderately vigorous.	Large medium	Firm, conical, dark red; fine flavour.	Moderately productive.
Laxford Hall..	" 8	Vigorous ...	Medium......	Firm, long, conical, clear red; good flavour.	Not productive.
Windsor Chief.	" 8	" ...	Large medium	Firm; a little acid; very good flavour.	Productive.
Sir Joseph Paxton.	" 8	Moderately vigorous.	Medium	Firm; fair quality...... .. .	Moderately productive.
Dr. Hogg	" 9	Vigorous ...	"	Firm; sweet, good flavour....	" ..
Imp. Jucunda .	" 10	" ...	Large medium	Firm; bright red; sweet, good flavour.	Productive.
British Queen..	" 11	" ...	Large	Firm, roundish conical, dark glossy red; sweet, fine flavour.	"
Michigan	" 14	" ...	Very large....	Firm; uneven in shape and in ripening; only fair flavour.	Not productive.
Arkansas Traveller	" 14	" ...	Large	Firm, conical, dark red; sweet fine flavour.	Productive.
Magoon	" 15	" ...	"	Firm, bright red; sweet, good flavour.	Moderately productive.

RED AND WHITE CURRANTS.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
La Turinese (red)	June 21	Vigorous....	Medium......	Cluster medium in length, well filled good quality.	Productive.
Fay's Prolific (red)	" 21	"	Large........	Cluster long, well filled good quality.	"
Large White Brandenburg.	" 21	"	"	Cluster long, well filled, sweet, good flavour, very fine.	"
White Kaiser.	" 21	"	Large medium	Cluster long, but not very well filled, good quality.	"
New Red Dutch	" 21	"	" .	Cluster medium in length, well filled, good quality.	"
White Pearl. ..	" 21	"	Medium......	Cluster medium in length, not very well filled, good flavour.	"
Victoria (red)...	" 22	" ...	Large.... ...	Cluster long, moderately well filled, good flavour.	"
Knight's Early Red.	" 22	"	Small........	Cluster short, fairly well filled, good flavour.	Moderately productive.
Prince Albert (red)	" 22	"	Large medium	Cluster long, moderately well filled, good flavour.	"
Chenonceau (red)	" 22	"	Very large....	Cluster long, well filled, sweet, fine flavour.	Productive.
Beauty of St. Giles (red)	" 22	Moderately vigorous.	Large	Cluster long, well filled, good flavour.	"
Moore's Ruby..	" 23	" ..	Small	Cluster medium in length, not well filled, acid, good flavour.	Not productive.
Versailles (red).	" 23	Vigorous....	Medium .	Cluster medium in length, well filled, good flavour.	Moderately productive.
Eyatt's New White (yellowish)	" 23	"	Large medium	Cluster long medium, fairly well filled, good flavour.	Productive.
White Cherry (yellowish)	" 23	"	" .	Cluster long, well filled, sweet, good flavour.	Moderately productive.
Large Red	" 23	" .. .	Medium......	Cluster long, moderately well filled, good flavour.	"
White Grape ..	" 23	"	Large medium	Cluster long, well filled, good quality.	"
Admirable (red)	" 23	Moderately vigorous.	Large	Cluster long, well filled, good quality.	"
English Red ...	" 24	Vigorous....	Large medium	Cluster long, well filled, good quality.	Productive.
Ringen's Red..	" 24	"	Small	Cluster medium in length, fairly well filled, good flavour.	"
Verrier's White	" 24	"	Large medium	Cluster long, not very well filled, good flavour.	Moderately productive.
White Champaigner	" 24	"	Small	Cluster long medium, fairly well filled, good flavour.	"
Frauendorfer (red)	" 25	"	Large	Cluster long, well filled, good flavour.	"
Red Gondoin..	" 25	"	Small	Cluster short, not well filled, poor quality.	Not productive.
Large White Dessert	" 25	"	Large........	Cluster long, well filled, acid, good flavour.	Moderately productive.
Raby Castle (red)	" 26	"	"	Cluster long, well filled, good flavour.	Productive.
London Red...	" 26	"	Large medium	Cluster long, fairly well filled, sweet, good flavour.	"
La Hative (red)	" 26	"	Medium......	Cluster medium, fairly well filled, sweet, good flavour.	"
Red Cherry....	" 26	"	Large........	Cluster long, moderately well filled, quality fair.	"
Large White...	" 26	"	Large medium	Cluster medium in length, well filled, good flavour.	"
Red Dutch	" 26	"	Medium.....	Cluster medium, well filled, acid, but good flavour.	"
White Dutch..	" 26	"	"	Cluster medium in length, well filled, acid, good flavour.	Not productive

RED AND WHITE CURRANTS—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
North Star (red)	June 26	Vigorous....	Medium....	Cluster long medium, not well filled, good flavour.	Productive.
White English (yellowish)	" 26	Moderately vigorous.	"	Cluster medium in length, not well filled, good flavour.	Not productive.
Red Champagner.	" 28	Vigorous....	"	Cluster long, fairly well filled, acid, but good flavour.	Productive.
La Conde......	" 29	"	"	Cluster medium in length, not well filled, good flavour.	Moderately productive.
White Gondoin.	" 29	"	Small	Cluster short, fairly well filled, sweet, good flavour.	Not productive.
Red Langtraubige.	" 29	"	Large	Cluster long, well filled, good flavour.	Productive.

BLACK CURRANTS.

Ruler..........	June 20	Vigorous....	Medium......	Cluster medium in length mild sweet, good flavour.	Moderately productive.
Sterling........	" 20	"	"	Cluster medium in length, flavour a little rank.	"
Gewohnliche...	" 21	" ..	Large	Cluster short, mild sweet, good flavour.	"
Victoria	" 22	"	"	Cluster long medium, sweet, fine flavour.	Productive.
Ambrafarbige..	" 22	"	"	Cluster medium in length, mild, good flavour.	Moderately productive.
Lennox........	" 22	"	Medium......	Cluster long medium, fairly good flavour.	"
Star.....	" 22	"	"	Cluster medium in length, pleasant, sweet, good flavour.	"
London........	" 22	"	"	Cluster medium in length, good quality.	"
Success........	" 22	"	"	Cluster long, sweet, mild flavour.	"
Beauty........	" 22	"	"	Cluster short, sweet, fairly good flavour.	Not productive.
Parker	" 22	"	Small	Cluster medium in length, flavour rank.	Moderately productive.
Eclipse........	" 22	"	Medium......	Cluster medium in length, quality fair.	"
Louise.........	" 23	"	"	Cluster medium in length, fine sweet, good flavour.	"
Bang Up......	" 23	"	Very large....	Cluster long, medium, mild sweet, good flavour.	"
Dominion......	" 23	"	Medium......	Cluster short, mild, good flavour.	"
Ethel..........	" 23	Moderately vigorous.	"	Cluster medium in length, acid, good flavour.	"
Black Naples ..	" 23	Vigorous....	Large medium	Cluster long, sweet, mild flavour.	"
Eagle..........	" 24	" ...	"	Cluster long, thick skin, rather rank.	"
Lanark........	" 24	"	Medium......	Cluster short, a little rank....	"
Wood.........	" 24	"	"	Cluster medium in length, fair quality.	"
Stewart	" 24	"	"	Cluster medium in length, flavour a little rank.	"
Kentish Hero..	" 24	"	" ...	Cluster medium in length, acid, good flavour.	Productive.
Merveille de la Gironde.	" 24	"	"	Cluster long, medium, good flavour.	"
Middlesex	" 24	Moderately vigorous.	"	Cluster medium in length, fair quality.	Moderately productive.
Pearce	" 25	"	" ...	Cluster medium in length, sweet, mild flavour.	"

BLACK CURRANTS—*Concluded.*

Name	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Clarence	June 26	Vigorous	Small	Cluster short, fairly good flavour.	Not productive.
Oxford	" 26	"	Medium	Cluster medium in length, quality fair.	"
Norton	" 26	"	Above medium	Cluster long, mild, sweet flavour.	Productive.
Bella	" 26	"	Small	Cluster short, rank flavour.	Not productive.
Monarch	" 26	"	Large medium	Cluster long, good flavour.	Productive.
Lee's Prolific	" 26	"	"	Cluster medium in length, fairly good flavour.	"
Kentville	" 27	"	Medium	Cluster short, rank flavour.	Moderately productive.
Ontario	" 28	"	Large	Cluster long, a little rank in flavour.	"
Ogden's Black	" 28	"	Large medium	Cluster short, flavour a little rank.	Productive.
Henry	" 28	"	Medium	Cluster long, sweet, good flavour.	"
Climax	" 28	"	Large	Cluster long, fair in quality.	"
Lewis	July 2	"	Small	Cluster medium in length, good flavour.	Moderately productive.
Pomona	" 4	"	Very large	Cluster long, sweet, good quality, very fine.	Productive.
Prince of Wales	" 4	"	Large	Cluster long, sweet, good flavour.	"
Baldwin	" 4	Not vigorous	Small	Cluster short, fairly good quality.	Moderately productive.
Manitoba Wild.	" 4	Vigorous	"	Cluster short, rank flavour.	Not productive.

BLACKBERRIES.

Early King	July 16.	Vigorous	Large medium	Good quality	Productive.
Minnewaska	" 17.	"	Large	Good quality, sweet	Fairly productive.
Early Harvest	" 18.	Moderately vigorous	Small medium	Fair quality	Not very productive.
Hansel	" 19.	Vigorous	Large	Very good quality	Productive.
Early Cluster	" 21.	"	Medium	Sweet, good quality	"
Snyder	" 21.	"	Large medium	Very good quality	"
Agawam	" 22.	"	" "	" "	"
Stone's Hardy	" 23.	"	" "	Good quality	"
Erie	" 23.	"	Large	A little acid, but good quality.	"
Taylor's Prolific	" 23.	"	"	Sweet, good quality	"
Lawton	" 25.	"	Large medium	Good quality	"
Eldorado	" 23.	"	Very large	Sweet, very fine flavour, good quality	"
Wilson's Early	" 25.	"	Large medium	Good quality	"
Tecumseh	" 25.	Moderately vigorous.	Small	Not very good quality	Not productive.
Thompson's Early Mammoth.	" 27.	Vigorous	Medium	" "	"
Kittatinny	" 27.	"	Large	Acid, but good quality	Productive.
Ohmer	" 27.	"	"	Fair in quality	"
Wilson Junior	" 29.	"	Medium	Good quality	Fairly productive.
Maxwell	" 29.	Moderately vigorous.	"	Fair quality	Productive.
Oregon Ever-bearing.	July 29 to Oct. 1	Very vigorous.	Large medium	Very good quality when fully ripened.	Very productive.

RED AND YELLOW RASPBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Hansell	June 10	Vigorous	Medium	Red, a little crumbly, sweet, good flavour.	Productive.
Thompson	" 12	"	"	Bright red, firm, good flavour.	"
Crimson Beauty	" 12	"	"	Bright red, firm, good flavour.	"
Champion	" 12	"	"	Red, soft, sweet, fair flavour.	Moderately productive.
Northumberland Fill Basket	" 14	"	Large	Dark red, firm, sweet, good flavour.	Productive.
Turner	" 14	"	Small	Red, crumbly soft, sweet.	"
Battler's Giant	" 14	"	Large	Dark red, firm, sweet, fine flavour.	"
Marlboro	" 16	"	Small	Red, soft, sweet, good flavour too small to be of commercial value.	Very productive.
Carter's Prolific	" 17	"	Medium	Red, firm, sweet, good flavour.	Productive.
Kenyon	" 18	"	Above medium	Dark red, firm, sweet, fine flavour.	"
Fastolff	" 18	"	Large medium	Bright red, firm, sweet, good quality, continues long in bearing.	"
New Fastollf	" 18	"	Large	Dark red, firm, sweet, good flavour, continues long in bearing.	"
Empire	" 18	"	Small	Dark red, sweet, fair flavour.	Moderately productive.
Carleton	" 18	"	Medium	Red, firm, sweet, good flavour.	Productive.
Sir John	" 18	"	"	Bright red, crumbly, sweet, good flavour.	Very productive.
Paragon	" 18	"	Large	Bright red, firm, fair quality.	Moderately productive.
Miller	" 18	"	Large medium	Bright red, firm, good flavour.	Productive.
Nonpareil	" 19	"	Medium	Red, crumbly, sweet, good flavour.	Moderately productive.
White Antwerp	" 20	"	Large	Yellowish white, soft, sweet.	Productive.
Franconia	" 20	"	Medium	Dark purplish red, acid, fair flavour.	"
Cariboo Wild	" 20	"	"	Some of the plants produce red berries and some yellow berries, soft, crumbly, tart, good flavour.	Not productive.
All Summer	" 20	"	Large medium	Red, firm, rich flavour, continues long in bearing.	Productive.
Belle de Fontenay	" 20	"	Large	Dark red, firm, good quality.	"
Billard's Perpetual	" 20	"	"	Clear red, crumbly, sweet pleasant flavour.	"
Lord Beaconsfield	" 20	"	"	Red, firm, sweet, very good quality.	"
Baumforth Seedling	" 20	"	Medium	Dark red, crumbly, fair flavour	"
Arnold's Hybrid	" 20	"	"	Dark red, soft crumbly, fair flavour.	Moderately productive.
Duke of Brabant	" 20	"	Large	Bright red, firm, sweet, very good quality.	Productive.
Sugar of Metz	" 20	Moderately vigorous	Medium	Yellow, soft, crumbly, sweet, not of much value.	"
Pauline	" 20	Vigorous	"	Red, firm, good quality	"
Large Yellow	" 21	"	Large	Pale yellow, soft acid	"
Garfield	" 21	Moderately vigorous.	Medium	Bright red, firm, good flavour.	"
R. B. Whyte	" 21	Vigorous	Large	Dark red, a little soft, good quality.	"
Muskingum	" 22	"	Large medium	Dark red, sweet, good flavour	Very productive.

RED AND YELLOW RASPBERRIES—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Brinckle's Orange.	June 22	Vigorous....	Large	Firm, sweet, good quality....	Productive.
Craig..........	" 22	"	Small	Clear red, rather soft, good flavour.	"
Sharpe	" 22	"	Large medium	Bright red, firm, sweet, good flavour.	"
Malta	" 22	"	Small	Yellow, soft, crumbly, sweet, pleasant flavour.	"
Yellow Antwerp.	" 22	"	Medium.. ...	Soft, liable to spoil on bush as soon as ripe.	"
Spineless Yellow.	" 22	"	Large	Soft, sweet, good for home use.	"
Autumn Surprise.	" 22	Moderately vigorous.	Small medium	Yellow, rather soft, sweet, fair flavour.	"
Muriel	" 23	Vigorous ..	Large medium	Dark red, firm, good flavour..	Moderately productive.
Percy	" 23	"	Large	Dark purple, firm, good flavour	Productive.
Lady Anne	" 23	"	Medium......	Yellow, crumbly, fair flavour.	"
Golden Queen..	" 25	" ...	Large	Firm, sweet, good quality, the best yellow raspberry we have.	"
Hornet	" 25	"	"	Dark red, firm, sweet, very good quality.	"
Prince of Wales	" 25	Moderately vigorous.	Medium......	Red, firm, sweet, fair flavour.	Moderately vigorous.
Loudon	" 26	Vigorous ..	Large	Bright red, firm, sweet, very good quality.	Productive.
Goliath	" 26	"	Medium.. ...	Dark red, soft, good flavour...	"
Heebner	" 28	"	Large medium	Red, firm, sweet, good flavour.	"
French Vice-President.	" 28	"	Very large....	Dark red, firm, rich flavour, very good berry.	"
Sarah	" 30	"	Medium......	Red, firm, sweet, good flavour, continues long in bearing.	Very productive.
Clarke	" 30	"	"	Red, firm, sweet, fairly good berry.	Productive.
Col. Wilder....	" 30	"	Large medium	Pale yellow, soft, sweet, pleasant flavour.	Moderately productive.
Knevit's Giant.	" 30	"	Large	Bright red, firm, good flavour.	Productive.
Chili	" 30	"	"	Light red, good quality.......	Moderately productive.
La Mercier	" 30	Moderately vigorous.	Large medium	Red, good quality...	Moderately productive.
Garnet........	June 30.	Vigorous. .	Small....	Dark purple, firm, fair flavour.	Productive.
Red Herrenhauser.	" 30.	" ...	Medium	Firm, sweet, fair flavour......	"
Queen of the Market.	" 30.	" ...	Large....	Dark red, sweet, firm, good quality, identical with Cuthbert.	"
Beehive.	" 30.	" ...	Medium......	Dark red, firm, sweet, good flavour.	Moderately productive.
Barnett.	" 30.	Moderately vigorous.	Small..	Crumbly, poor quality........	Not productive.
Cuthbert	" 30.	Vigorous. ..	Large........	Dark red, firm, sweet, very good quality.	Productive.
Shaffer's Colossal.	" 31	" ...	"	Dark purplish red, firm acid, good flavour when very ripe.	Very productive.
Queen Victoria.	July 1	" ...	Medium......	Red, soft, crumbly, poor quality.	Productive.
Conrath.	" 4.	" ...	Large........	Red, firm, acid, fine flavour...	"
American Yellow.	" 4.	" ...	Small........	Sweet, pleasant flavour.......	"
Minnie..	" 8.	" ...	Medium... .	Purple, crumbly, acid........	"
Hudson River Antwerp.	" 8.	" ...	Small medium	Dark red, soft, sweet, not very good quality.	"

BLACK CAP RASPBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Smith's Prolific	June 30.	Vigorous. . .	Medium	Fairly good quality.	Productive.
Early Ohio . . .	" 30.	" . . .	" . . .	Not very good quality.	"
Nemaha	July 5.	" . . .	Large	Fine flavour, good quality.	"
Conrath.	" 5.	" . . .	"	Good quality.	"
Lovett	" 6.	Moderately vigorous.	Medium	"	"
Older	" 6.	Vigorous. . .	Large medium	"	"
Cromwell	" 7.	" . . .	Medium	Fairly good quality.	"
Kansas.	" 7.	" . . .	"	Sweet, good quality.	"
Palmer.	" 7.	" . . .	"	Fairly "	"
American Yellow Cap.	" 8.	" . . .	"	Sweet pleasant flavour.	"
Ada	" 10.	" . . .	"	Very good quality.	"
Gregg	" 11.	" . . .	Large	" "	"
Progress	" 11.	" . . .	"	Sweet, good quality.	"
Jackson's May King	" 13.	" . . .	Small medium	Poor quality.	Not productive.
Hopkins	" 13.	" . . .	Medium	Good "	Productive.

ADDITIONS TO THE COLLECTIONS OF FRUITS.

The following additions have been made this year to the collections of fruits on the Agassiz Farm, either from the Central Experimental Farm or from European nurseries:—

Apples	36	varieties.
Pears	7	"
Plums	19	"
Cherries	9	"
Strawberries	7	"

Nearly all of these have grown well, and are in fine condition.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Degrees.	Date of Lowest Temperature.	Degrees.	Rainfall.	Snowfall.	Sunshine.
1899.		1899.		Inches.	Inches.	Hours. M.
December 31	53	December 17	16	9·90	2½	26 30
1900.		1900.				
January 27	62	January 27 and 29	27	13·00	4	55 48
February 28	58	February 15	9	3·01	8	61 42
March 31	77	March 17	29	6·19	....	100 24
April 29	90	April 25	30	3·40	...	139 27
May 1	86	May 26	37	7·60	....	145 54
June 27	84	June 7	40	10·76	....	169 42
July 21	97	July 9	45	1·21	..	238 03
August 19	19	August 22	40	5·65	....	136 24
September 13	87	September 30	34	2·77	....	135 54
October 8	70	October 27	34	5·13	....	73 12
November 13	65	November 20	12	3·39	16	81 12
	....	....	....	72·01	30½	1,364 12

1899.	Highest. Tempera-ture.	1899.	Lowest Tempera-ture.	Rainfall.	Snowfall.	Sunshine. Hours. M.
July 26	96	February 3 and 4	5	58·17	41	1,110 42
1898.		1898.				
August 10	103	January 23	20	46·55	20	1,506 54
1897.		1897.				
August 16	97	November 28	10	65·95	45½	1,474 00
1896.		1896.				
June 26	95	November 27	9	63·47	75½	1,417 27

The record for the twelve months ending November 30, shows a medium sunshine total for the year, and a medium snowfall, but the heaviest rainfall since this meteorological station has been opened.

I have the honour to be, sir,

Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS FOR THE YEAR ENDING JUNE 30, 1900.

CENTRAL EXPERIMENTAL FARM—EXPENDITURE, 1899-1900.

Live stock	$ 1,161 36
Feed for stock, including veterinary services	306 72
Seed grain, seeds, trees, &c.	856 00
Implements, tools, hardware and supplies	884 60
Drainage and drain tiles	2,155 81
Manure and fertilizers for experimental plots and Hort. dept.	209 46
Travelling expenses	1,410 91
Exhibition expenses	294 28
Blacksmithing, harness supplies and repairs	335 40
Bee department	258 84
Salaries	1,920 00
Wages, farm work, including experimental work with grain and other farm crops ; also, salaries of officers in charge	6,788 03
Wages, care of stock	2,153 94
Chemical department proportion chargeable to the Central Farm	1,285 40
Botanical and Entomological department proportion chargeable to the Central Farm	1,369 11
Horticultural department, including salary of officer in charge	4,049 79
Poultry department, including salary of officer in charge	1,753 95
Forestry department and care of grounds	1,057 52
Arboretum	783 25
Distribution of trees and tree seed	89 54
Office help, correspondence branch and messenger service	3,964 93
Printing and stationery	704 02
Seed testing and care of greenhouses	977 98
Dairy department	817 42
Contingencies	511 66
Books and newspapers	145 57
Telegrams and telephones	156 74
Steers purchased for feeding experiments	2,464 00
Hogs purchased for feeding experiments	1,402 23
	$ 40,268 46
Less—Proceeds of sale of steers purchased for feeding experiments	3,842 97
	$ 36,425 49

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1899–1900.

Live stock	$ 85 30
Feed for stock, including veterinary services	2,241 56
Seed grain, seeds, trees, &c.	360 49
Implements, tools, hardware and supplies	344 65
Manure and fertilizers	471 21
Travelling expenses	274 95
Exhibition expenses	167 23
Blacksmithing, harness supplies and repairs	111 77
Salary of Superintendent, also proportion of salaries for general work, Ottawa	2,520 00
Wages, farm work, including experimental work with farm crops	2,847 18
Wages, care of stock	1,265 38
Chemical department, proportion chargeable to each branch farm	749 83
Botanical and Entomological department, proportion chargeable to each branch farm	525 00
Poultry department	97 85
Horticultural department, including salary of officer in charge	1,172 81
Forestry department, including care of grounds	154 96
Seed grain distribution	142 50
Contingencies, including postage, $33.00; mail delivery, $97.50.	210 90
Printing and stationery	31 41
Books and newspapers	27 30
Telegrams and telephone	39 43
Steers purchased for feeding experiments	1,485 00
	$ 15,326 66
Less—Proceeds of sale of steers purchased for feeding experiments	2,315 02
	$ 13,011 64

EXPERIMENTAL FARM, BRANDON, MANITOBA—EXPENDITURE, 1899-1900.

Live Stock	$ 461 98
Feed for stock, including veterinary services	110 75
Seed grain, seeds, trees, &c	89 56
Implements, tools, hardware and supplies	403 06
Travelling expenses	114 05
Exhibition expenses	145 04
Blacksmithing, harness supplies and repairs	328 08
Bee department	8 52
Salary of Superintendent, also proportion of salaries for general work, Ottawa	2,520 00
Wages, farm work, including experimental work, with farm crops, &c	3,320 98
Wages, care of stock	815 25
Chemical department, proportion chargeable to each branch farm	749 83
Botanical and Entomological department, proportion chargeable to each branch farm	525 00
Horticultural department	553 14
Forestry department, including care of grounds	934 00
Poultry department	74 75
Office help, including delivery of mail, $143.00	575 86
Seed grain distribution	355 72
Tree distribution	403 46
Contingencies, including postage, $53.63	133 72
Printing and stationery	162 18
Books and newspapers	23 00
Telegrams and Telephones	40 69
Steers purchased for feeding experiments	586 00
	$ 13,434 62
Less—Proceeds of sale of steers purchased for feeding experiments	731 02
	$ 12,703 60

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE, 1899-1900.

Live stock	$ 40 25
Feed for stock, including veterinary services	67 63
Seed grain, seeds, trees, &c	40 88
Implements, tools, hardware and supplies	809 03
Travelling expenses	119 85
Exhibition expenses	73 00
Blacksmithing, harness supplies and repairs	219 21
Salary of Superintendent, also proportion of salaries for general work, Ottawa	2,520 00
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c	4,040 87
Wages, care of stock	865 75
Chemical department, proportion chargeable to each branch farm	749 73
Botanical and Entomological department, proportion chargeable to each branch farm	525 00
Horticultural department	189 37
Poultry department	77 80
Forestry department, including care of grounds	346 90
Office help	623 40
Seed grain distribution	354 14
Tree distribution	200 03
Contingencies, including postage, $106.01	172 48
Printing and stationery	27 45
Telegrams	12 34
Books and newspapers	6 50
Bee supplies	2 25
	$ 12,083 96
Less—Proceeds of sale of steers	385 00
	$ 11,698 96

EXPERIMENTAL FARM, AGASSIZ, B. C.—EXPENDITURE, 1889–1900.

Live stock—registration fees	$ 75
Feed for stock, including veterinary services	7 76
Seed grain, seeds, trees, etc	404 46
Implements, tools, hardware and supplies	313 61
Manure and fertilizers	81 45
Travelling expenses	201 45
Exhibition expenses	244 84
Blacksmithing, harness supplies and repairs	108 65
Salary of Superintendent, also proportion of salaries for general work, Ottawa	2,520 00
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c	2,595 82
Wages, care of stock	439 50
Chemical department, proportion chargeable to each branch farm	749 83
Botanical and Entomological department, proportion chargeable to each branch farm	525 00
Poultry department	111 25
Forestry department	263 95
Office help	130 00
Seed grain distribution	111 32
Tree distribution	21 61
Clearing land	892 25
Contingencies, including postage, $52.96	188 62
Printing and stationery	7 80
Books and newspapers	22 00
Telegrams	1 45
	$ 9,943 37

SUMMARY.

Central Experimental Farm		$ 36,425 49
Nappan "		13,011 64
Brandon "		12,703 60
Indian Head "		11,698 96
Agassiz "		9,943 37
Seed grain distribution from Central Experimental Farm		4,216 94
Printing bulletins and distribution of bulletins and reports	$ 4,000 00	
Less special sum in estimates for this item	4,000 00	
		$ 88,000 00

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &c., ON HAND DECEMBER 31, 1900.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

15 Horses	$ 1,360 00
4 Ayrshire cattle	340 00
4 Guernsey cattle	325 00
25 Grade cattle	677 00
10 Yorkshire swine	147 00
3 Berkshire swine	67 00
6 Tamworth swine	53 00
40 Grade swine	240 00
9 Shropshire sheep	210 00
13 Leicester sheep	226 00
13 Grade sheep	43 00
Farm machinery and implements	2,763 50
Vehicles, including farm wagons and sleighs	1,058 00
Hand tools, hardware and sundries	1,068 35
Harness	302 90
Dairy department, machinery, &c	625 00
Horticultural and Forestry departments, implements, tools, &c	589 65
Botanical department, implements, tools, &c	11 00
Poultry department, 236 fowls	223 00
Poultry department, implements, furnishings, &c	115 45
Bees and apiarian supplies	413 95
Chemical department, apparatus and chemicals	2,100 00
Books in several departments	495 85
Greenhouse plants, supplies, &c	1,482 00
Furniture at Director's house	1,253 85
Office furniture and stationery	1,529 00
	$ 17,719 50

EXPERIMENTAL FARM, NAPPAN, N.S.

7 Horses	$ 765 00
4 Guernsey cattle	450 00
5 Holstein cattle	450 00
6 Ayrshire cattle	350 00
32 Grade cattle	1,124 00
2 Yorkshire swine	35 00
2 Berkshire swine	40 00
3 Tamworth swine	38 00
63 Grade swine	270 00
49 Sheep	201 00
41 Fowls	23 75
Bees and apiarian supplies	37 95
Vehicles, including farm wagons and sleighs	365 00
Farm machinery	510 00
Farm implements	223 00
Hand tools, hardware and sundries	474 60
Harness	219 00
Furniture for reception room and bedroom for visiting officials	173 50
Furniture supplies and books for office	92 00
	$ 5,571 80

EXPERIMENTAL FARM, BRANDON, MANITOBA.

12 Horses	$ 1,035 00
5 Ayrshire cattle	240 00
6 Durham cattle	720 00
1 Guernsey bull	100 00
4 Holstein cattle	125 00
6 Grade cattle	115 00
1 Chester White swine	15 00
10 Tamworth swine	85 00
6 Berkshire swine	50 00
2 Yorkshire swine	22 00
7 Grade swine	14 00
50 Fowls	50 00
Bees and apiarian supplies	105 05
Vehicles, including farm wagons and sleighs	497 00
Farm machinery	927 00
Farm implements	630 00
Hand tools, hardware and sundries	585 27
Harness	213 50
Furniture for reception room and bedroom for visiting officials	161 55
Furniture supplies and books for office	282 40
	$. 5,972 77

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

13 Horses	$ 1,230 00
1 Ayrshire bull	75 00
12 Durham cattle	945 00
1 Guernsey bull	70 00
18 Grade cattle	465 00
4 Berkshire swine	60 00
2 Tamworth swine	30 00
62 Fowls	36 50
Bees and apiarian supplies	33 75
Vehicles, including farm wagons and sleighs	475 00
Farm machinery	1,191 00
Farm implements	685 00
Hand tools, hardware and sundries	414 50
Harness	178 00
Furniture for reception room and bedroom for visiting officials	168 50
Furniture supplies and books for office	219 90
	$ 6,277 15

EXPERIMENTAL FARM, AGASSIZ, B.C.

6 Horses	$ 520 00
3 Durham cattle	240 00
17 Grade cattle	464 00
9 Dorset horned sheep	75 00
2 Berkshire swine	45 00
12 Tamworth swine	85 00
8 Grade swine	30 00
39 Fowls	37 00
Bees and apiarian supplies	35 95
Vehicles, including farm wagons	230 00
Farm machinery	558 00
Farm implements	156 00
Hand tools, hardware and sundries	167 85
Harness	45 05
Furniture for reception room and bedroom for visiting officials	188 90
Furniture supplies and books for office	156 25
	$ 3,034 00

W. H. HAY,
Accountant.

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