DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT

C. F. BAILEY, B.S.A.

FOR THE YEAR 1929

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NOTES ON THE SEASON

During January and the first nine days of February, the fields were partly bare and partly covered with ice and frozen snow. From February 10 to the middle of March, the fields were covered evenly with snow. This snow was removed by rain and warm weather.

The spring was late. The ice ran out of the St. John river on April 19. The weather remained cold, however, during April and the first three weeks in May. Four inches of snow fell on May 19. This snow established a record as it was the latest date on which snow had fallen and it was also the heaviest snowfall in May since the Station was established.

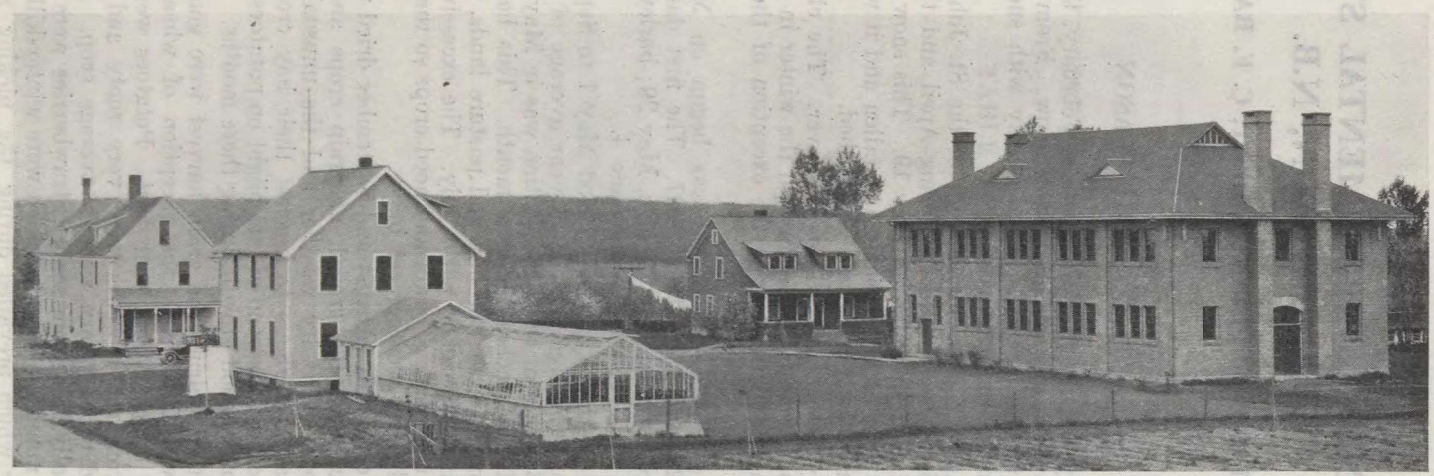
There was very little winter-killing, however. The clover and grasses on both the hay and pasture land came through the winter in good condition, also, the orchard and the small fruits with the exception of the strawberries which suffered severely.

The land dried slowly. Ploughing was begun on May 9 as compared with May 1 in 1928, and April 21 in 1927. The first dates of seeding under field conditions were: wheat, May 17; oats, May 29; barley, May 27; potatoes, June 3, sunflowers, June 11; and corn, June 4.

The precipitation for the growing period May 1 to September 30 inclusive, was 15·48 inches as compared with a 16 year average of 15·86 inches. This year, however, 5·03 inches of this precipitation was in May as compared with a 16 year average of 2·54 inches for that month. This heavy rainfall insured a good supply of moisture for the hay and pasture lands, both of which made splendid growth during June and early July. The excessive moisture in May, however, delayed the seeding of grain and hoed crops so that they were not well established when the dry weather set in.

The dry weather in July, August and September dried up pastures, lessened the tillering and checked the growth of grain crops and also retarded the growth of root crops. The dry weather and the unusually large amount of bright sunshine enabled farmers to harvest their hay crops in splended condition, and also checked the spread of late blight on potatoes. Nothwithstanding a slow shart, corn made good growth during these months.

Weather conditions during the grain harvest were good. Straw was light but grains were well filled with the exception of wheat which was badly shrunken owing to damage from stem rust. Potatoes were a good crop, and remarkably free from rot. Swedes were very rooty and there were a large number of unsound roots. Corn was an average crop. Apples were a good crop and exceptionally free from scab. Strawberries were a light crop, partly owing to the large number of plants which were winter-killed and partly owing to the dry weather which prevailed during the picking season. Other small fruits were good. Speaking generally, vegetables were good.



Partial view of the buildings at the Fredericton Experimental Station, showing greenhouse on the left and the agricultural school on the right.

Young cattle were housed on October 18 and the sheep on November 19. It was possible to plough on nearly every day until November 19. The St. John river froze at the Experimental Station on November 22. December was colder than usual and there was 17 inches of ice on the St. John river at the end of the month.

Two inches of snow fell on November 18 but it was removed by rain the same day. Three inches of snow fell on November 25. This snow stayed on the ground as did nearly all the snow which fell in December. The 0·98 inches of rainfall recorded from December 18-20, was largely in the form of sleet and stayed on the ground in the form of ice. There was 20 inches of snow on the fields at the end of the month.

TABLE 1.—METEOROLOGICAL RECORDS

Month	Temperature (F).						Precipitation				Sunshine	
	Mean		Maximum		Minimum				Total Precipitation			
	1929	Average, 16 years	Highest	Mean Maximum	Lowest	Mean Minimum	Rain	Snow	1929	Average, 16 years	1929	Average, 16 years
	°	°	°	°	°	°	in.	in.	in.	in.	hours	hours
January	15·25	12·66	54·0	25·74	−25·0	4·77	1·41	15·0	2·91	3·55	115·2	105·30
February	15·64	14·26	40·0	27·17	−22·0	4·1	0·73	21·5	2·88	2·71	131·4	121·62
March	28·38	26·67	53·0	38·00	−8·0	18·77	1·20	16·0	2·8	2·82	135·2	147·59
April	37·71	40·04	63·0	47·5	10·0	27·93	2·44	2·5	2·69	3·24	149·2	158·72
May	51·16	50·98	92·0	63·35	29·5	38·98	4·63	4·0	5·03	2·54	204·7	199·59
June	61·25	60·22	89·0	73·10	41·0	49·4	2·52	.....	2·52	3·24	209·0	207·07
July	66·03	66·52	88·0	78·16	38·0	53·9	3·87	.....	3·87	3·12	283·4	222·56
August	62·94	63·92	82·0	73·77	43·0	52·11	2·15	.....	2·15	3·76	221·5	204·61
September	57·73	56·12	82·0	68·56	30·0	46·9	1·91	.....	1·91	3·12	155·1	166·76
October	44·06	46·00	69·0	52·35	21·0	35·77	3·48	.....	3·48	3·65	118·7	144·77
November	33·00	32·72	59·0	41·03	1·0	24·98	1·72	5·0	2·22	2·88	97·0	91·15
December	16·48	19·20	39·0	24·46	−11·0	8·50	0·98	32·0	4·18	3·13	67·6	89·52
1929	40·80	.....	.....	.....	.....	.....	.....	.....	36·64	.....	1,888·0	1,859·26

ANIMAL HUSBANDRY

The work carried on under this Division consisted of breeding and feeding experiments, cost of production and demonstrational work.

CATTLE

There were twenty-four Ayrshires and sixteen Holsteins at the Station on January 1, 1930.

A new Ayrshire herd sire Ste. Anne Briery Supreme —105382— was obtained from the Nappan Experimental Farm. This bull's dam Briery Lass —85707— has an R.O.P. record as a mature cow of 22,035 pounds milk and 979 pounds fat.

The herd was blood tested for contagious abortion four times during the year. These tests are being conducted in co-operation with the Health of Animals Branch to ascertain the feasibility of eradicating contagious abortion from a dairy herd by blood testing the animals and either slaughtering or isolating under the "Bang" system, all animals which give positive reactions.

SUMMER FEEDING

In order to determine the merits of rotational grazing, coupled with heavy applications of commercial fertilizer, a pasture fertilization experiment was begun in 1928. A summary of the results for that year was given on page 4 of the 1928 report of this Station.

This year the experiment was enlarged so as to compare rotational grazing on fertilized pastures with continuous grazing on both fertilized and unfertilized pastures. As the work the previous summer indicated that cows on heavily fertilized pasture did not require mill feed, none was fed during the early part of the summer. During the latter part of the summer, cows giving a heavy milk flow were fed a small grain ration. No green feed nor silage was fed, however, during the pasture season. A full report of this experiment is given in the fertilizer section of this report.

WINTER FEEDING

The roughage ration for the winter consisted chiefly of mixed clover and timothy hay, swedes and silage. (As most of the corn did not germinate, the silage this year was composed of a mixture of corn, sunflowers, oats and peas, and clover aftermath.) A small quantity of other feeds, such as mangels, were fed but they were not considered the main feed.

The meal ration varied at times owing to the nature of the feeds on hand, but consisted for the most part of bran, one part; crushed oats, one part; brewers' grains, two parts and oilcake, one part. One per cent of salt and one per cent of bone char were added at mixing.

DAIRY HERD RECORDS

Table 2 shows the milk record of all the milch cows that finished a lactation period during the year 1929. For heifers with their first calf, feed is charged from date of freshening. For cows with previous lactation periods, feed is charged for the period during which they were dry before beginning the lactation period here recorded. The following prices were charged for feed:—

Hay	$ 9 30	per ton
Roots	3 18	"
Ensilage	5 32	"
Meal mixture	43 00	"
Pasture	2 00	per month

These values represent the cost of production of hay (after allowing for 10 per cent shrinkage in the mow), the cost of production of roots and ensilage for 1928, and the prices paid in 1929 for carload lots of feeds plus a small charge for hauling from car to barn and mixing of the grains which make up the meal mixture.

TABLE 2—INDIVIDUAL MILK RECORDS DURING THE YEAR

Name of cow	Age at beginning of lactation period	Date of dropping calf	Number of days in lactation period	Total pounds of milk for period	Daily average yield of milk	Average per cent fat in milk	Pounds of butter produced in period	Value of butter at 40c. per pound	Value of skimmilk at 20c. per cwt.	Total value of product	Amount of meal eaten at $43 per cwt.	Amount of roots at $3.18 per ton and ensilage at $5.32 per ton	Amount of hay eaten at $9.30 per ton	Amount of beet pulp at $49.50 per ton	Months on pasture at $2.00 per month	Total cost of feed for period	Cost to produce 100 pounds of milk	Cost to produce 1 pound butter skimmilk neglected	Profit on 1 pound butter skimmilk neglected	Profit on cow during period labour and calf neglected
	years			lb.	lb.	p.c.	lb.	$ cts.	$ cts	$ cts.	lb.	lb.	lb.	lb.	mos.	$ cts.	$	cts.	cts.	$ cts.
Ayrshires																				
Fredericton Pansy	5	Dec. 17, 1928	361·5	6,827·5	18·89	3·99	320·60	128 24	13 11	141 35	1,737	R–6,616 E- 2,430	4,445	.....	5·16	85 32	1·250	26·6	13·4	56 03
Fredericton Briery	2	Aug. 30, 1928	326·0	6,668·1	20·45	3·78	296·72	118 69	12 83	131 52	2,020	R–5,510 E- 2,430	3,600	.....	3·02	81 43	1·221	27·4	12·6	50 09
Fredericton Starlight	4	Nov. 3, 1928	283·5	6,535·5	23·05	3·99	306·88	122 75	12 55	135 30	2,160	R–6,600 E- 1,500	3,560	.....	4·73	86 93	1·330	28·3	11·7	48 37
Fredericton Spottie	3	Aug. 17, 1928	355·5	6,520·5	18·34	3·86	296·48	118 59	12 54	131 13	2,174	R–7,440 E- 2,430	3,630	.....	5·38	92 67	1·421	31·3	8·7	38 46
MacPine Pearl	7	Feb. 23, 1929	240·0	5,809·7	24·21	3·56	243·31	97 32	11 21	108 53	921	R–4,286 E- 2,430	3,168	.....	4·36	56 52	0·973	23·2	16·8	52 01
Lennoxville Dairymaid 9th	3	Sept. 12, 1928	292·0	3,988·7	13·66	4·15	194·67	77 87	7 65	85 52	1,632	R–5,600 E- 2,430	3,630	.....	2·49	72 31	1·813	37·1	2·9	13 21
Lennoxville Dairymaid 8th	3	Oct. 24, 1928	250·5	3,957·7	15·80	3·99	185·71	74 28	7 60	81 88	2,050	R–6,473 E- 1,500	3,554	.....	2·42	79 73	2·015	42·9	2·9	2 15
Lennoxville Marjorie 4th	4	Mar. 23, 1929	267·0	3,825·8	14·33	4·13	185·93	74 37	7 34	81 71	1,152	R–4,456 E- 2,430	2,990	.....	4·36	60 94	1·593	32·8	7·2	20 77
Average for Breed	.....	.....	297·0	5,516·6	18·57	3·91	253·79	101 51	10 60	112 11	1,731	R–5,873 E- 2,198	3,572	.....	3·99	76 98	1·395	30·3	9·7	35 13
Holsteins																				
Fredericton Helen	4	Sept. 13, 1928	386·5	13,369·4	34·59	3·19	501·00	200 40	25 89	226 29	2,894	R–9,593 E- 2,000	3,806	.....	6·11	112 71	0·843	22·5	17·5	113 58
Fredericton Cheer Echo	3	Jan. 30, 1929	332·0	12,340·3	37·17	2·91	423·11	169 24	23 96	193 20	2,582	-11256 E- 750	3,622	1,250	4·30	131 79	1·068	31·1	8·9	61 41
Francy DeKol Posch	6	Mar. 7, 1929	298·5	10,900·8	36·52	3·12	400·29	160 12	21 12	181 24	2,221	R–7,946 E- 3,240	4,169	.....	4·33	97 05	0·890	24·2	15·8	84 19
Fredericton Johanna Alcartra	4	Nov. 19, 1928	294·0	8,569·5	29·15	3·31	333·99	133 60	16 57	150 17	2,065	R–6,834 E- 2,000	3,610	.....	3·30	83 98	0·980	25·1	14·9	66 19
Fredericton Frances	4	Feb. 11, 1929	307·0	7,710·6	25·11	3·21	290·82	116 33	14 93	131 26	1,841	R–7,646 E- 2,000	3,714	.....	4·33	82 99	1·076	28·5	11·5	48 27
Average for Breed	.....	.....	323·6	10,578·1	32·69	3·13	389·84	155 94	20 49	176 43	2,321	R–8,655 E- 1,998	3,784	250	4·47	101 70	0·961	26·1	13·9	74 73

R—Roots. E—Ensilage.

Calves were fed whole milk until three to four weeks of age, then they were gradually changed to skim-milk. A fat substitute composed of one part flax seed and four parts crushed oats, was added to the skim-milk. Each calf was fed from one-quarter to one pound of this fat substitute per day, the amount depending upon the age and condition of the calf. The calves were also fed hay, roots and dry grain, as soon as they would eat them. The composition of this dry meal mixture varied slightly at times, owing to the nature of the feed on hand, but was mainly made up of three parts bran, two parts crushed oats, one part oilcake, and one part brewers' grains. The aim in feeding was to keep the calves growing and to avoid a setback.

Cattle grazing on an improved pasture area on the Fredericton Station.

Yearling and two-year old heifers were turned to pasture on May 30. They were wintered on hay, roots and silage. They were not grain fed unless they were in exceptionally poor condition. The feed costs are shown in table 3.

TABLE 3.—COST OF RAISING DAIRY HEIFERS

Average cost of Feed—Birth to one year for Six Heifers

(4 Ayrshires, 2 Holsteins)

Item	Amount of feed consumed	Cost of feed
	lb.	$
New milk at $40 per ton	336	6 72
Skim-milk at $4 per ton	3,325	6 65
Fat substitute at $55 per ton	202	5 56
Dry meal at $41 per ton	711	14 58
Turnips at $3.18 per ton	1,387	2 21
Ensilage at $5.32 per ton	495	1 32
Hay at $9.30 per ton	1,327	6 17
	days	0 41
Pasture at 1·5 cents per day	27	43 62
Average cost of feed per head	.....	
	lb.	
Average weight at 1 year	615	

Average Cost of Feed—One to two years for Six Heifers

(4 Ayrshires, 2 Holsteins)

	lb.	$
Dry meal at $41 per ton	380·5	7 80
Turnips at $3.18 per ton	3,164	5 03
Ensilage at $5.32 per ton	1,449	3 85
Hay at $9.30 per ton	2,353	10 94
	mos.	
Pasture at $1.50 per month	4·38	6 57
Average cost of feed per head	.....	34 19
	lb.	
Average weight at 2 years	897	

HEAVY VERSUS LIGHT FEEDING OF SWEDES TO MILCH COWS

The past two seasons an experiment has been carried on testing the effect of heavy versus light feeding of swedes. The results for the two years have been very similar and while more work is necessary before definite conclusions can be drawn, results seem to show:—

That when cows are fed good hay, together with a liberal grain ration, the addition of roots will increase production, but will not materially reduce the cost of either milk or butter.

That while feeding roots in large quantities will increase production of both milk and butter, this increase will be at a higher cost than when a normal amount of roots is fed.

SHEEP

The flock on December 31, 1929, consisted of one aged ram, one ram lamb, twenty-six ewes and nine ewe lambs.

CONTROL OF PARASITES

EXTERNAL.—The flock was dipped in Cooper's Dip in the spring and again in the fall. This treatment gave excellent results.

INTERNAL.—The continued use of the copper sulphate-mustard drench has apparently freed the flock from tapeworms and stomach worms. This is an excellent drench and has the added merit of being inexpensive. Directions for preparing and administering this drench may be obtained by writing to this Station.

TREATMENT OF PREGNANT EWES WITH IODIZED SALT

In order to ascertain whether ewes would have stronger lambs if fed iodized salt during pregnancy, the last three winters approximately one-half of the breeding ewes at the Station have had access to iodized salt during the time they were pregnant, while the remaining ewes have had access to common salt. This iodized salt was prepared by drying the moisture out of 50 pounds of common salt and then sprinkling it with two ounces of potassium iodide dissolved in water. Allowing pregnant ewes access to iodized salt had little if any effect upon the strength of the lambs in 1927. In 1928 and 1929, however, the ewes fed iodized salt during their pregnancy had, generally speaking, stronger lambs than the ewes which had access to common salt. The experiment will be continued.

MAINTENANCE OF FLOCK

The sheep were housed on November 10, 1928, and went to pasture on May 29, 1929. From November 20 to March 21 the ewes were fed hay and roots. From March 21 they were fed one-half pound of grain each day. The shearlings

were each fed one-half pound of grain each day from the time they were housed until May 29. The returns were disappointing as the imported ram—Minton 99—62072—proved a poor breeder, only eight of the nineteen ewes bred proving in lamb.

The breeding ewes sheared an average of 7·83 pounds of wool, the shearling ewes an average of 8·08 pounds and the ram sheared 12·5 pounds.

HORSES

On January 1, 1930, there were nineteen horses in stock, including nine pure-bred Clydesdales, two pure-bred Percherons, two pure-bred French Canadians, four Grade Clydesdales and two general-purpose horses.

Two pure-bred Percheron mares, viz., Mela de Ste. Anne 3rd (13103) and Ste. Anne Mela 5th (14630) were transferred from the Ste. Anne de la Pocatière Experimental Station in November.

The grain ration for the work horses consisted of a mixture of oats and bran. The percentage of the bran varied according to the character of the work. The horses worked a total of 19,730 hours during the year. Eight heavy horses worked a total of 15,235 hours. The cost of feed and horse-shoeing for these eight horses were as follows:—

26 tons 1,638 pounds of hay at $9.30 per ton	$	249 42
1,036 bushels 31 pounds oats at 73 cents per bushel		756 95
3 tons 1,193 pounds bran at $31.60 per ton		113 65
1 ton 522 pounds roots at $3.18 per ton		4 01
Horse-shoeing at $3 for new shoes and $1.75 for changing shoes		149 50
Total cost (labour, interest, depreciation and drugs neglected)		1,273 53
Number of hours worked		15,235·0
Cost of horse labour per hour	$	0·0836

FEED COST OF RAISING YOUNG HORSES

The last three foals reared at the Station were not weaned until approximately six months of age. Until weaned, each foal had access to the feed fed their dams, both when at pasture and when in the stable, therefore records could not be kept of the feed consumed by these foals the first six months. Table 4 gives the average cost of feed for three horses from six months to one year, and for two horses from six months to two years, and the cost for one horse from six months to three years.

TABLE 4.—FEED COST OF RAISING YOUNG HORSES

—		Average for 3 horses, 6 months to 1 year	Average for 2 horses, 6 months to 2 years	For 1 horse. 6 months to 3 years
Oats	lb.	681·0	2,193·0	3,691·0
Bran	lb.	429·0	1,041·0	1,479·0
Roots	lb.	85·0	158·0	327·0
Hay	lb.	1,610·0	4,454·0	7,764·0
Pasture	months	0·5	5·5	12·8
Weight at beginning of period	lb.	621·0	617·0	585·0
Weight at end of period	lb.	807·0	1,093·0	1,350·0
Gain in period	lb.	186·0	476·0	765·0
Statement of Costs				
Oats at $42.94 per ton	$	14 62	47 08	79 25
Bran at $31.60 per ton	$	6 78	16 45	23 37
Roots at $3.18 per ton	$	0 14	0 25	0 52
Hay at $9.30 per ton	$	7 49	20 71	36 06
Pasture at $2. per month	$	1 00	11 00	25 60
Total cost of feed	$	30 03	95 49	164 80

SWINE

The breeding herd of swine at this Station on December 31, 1929, numbered twelve head, consisting of two pure-bred Yorkshire boars and ten pure-bred Yorkshire sows. The aged boar "Ottawa Alexander 239"—120064—that has given such excellent satisfaction as herd sire during the past two years was shipped to the Experimental Station at Ste. Anne de la Pocatiere. The progeny of the Junior herd boar "Brandon A.F. 336" —130240— when crossed with the daughters of the senior sire "Ottawa Alexander 239" lacked very much in uniformity and while they proved to be good feeders and doers, the lack of uniformity evident was decidedly unsatisfactory from a breeding standpoint. A proven boar "Keppoch Morvin Duke" —103734— is now being used.

During the past year the demand for breeding stock—mainly weanlings, was far in excess of our supply and many orders were diverted to other sources of supply.

TABLE 5—FARROWING RECORDS

Sow number	Sire of litter	Farrowing date	Number of pigs in litter	Number reared
287	Ottawa Alexander 239	April 12, 1929	11	6
676	Brandon A F 336	April 15, 1929	11	11
680	Brandon A F 336	April 15, 1929	8	7
677	Brandon A F 336	April 17, 1929	6	6
682	Brandon A F 336	April 16, 1929	12	11
678	Brandon A F 336	April 19, 1929	12	9
586	Ottawa Alexander 239	April 19, 1929	19	3
381	Brandon A F 336	April 26, 1929	14	9
679	Ottawa Alexander 239	May 16, 1929	10	8
	Total	.....	103	70

Average number of pigs farrowed per spring litter	11·44
Average number of pigs reared per spring litter	7·7
Percentage of pigs reared per spring litter	67·3

COST OF REARING LITTERS

Statement of feed fed to sows from breeding date to date of farrowing:—

Roots (mangels), 805 pounds at $3.18 per ton	$ 1 28
Crushed oats, 210 pounds at $48 per ton	5 04
Middlings, 210 pounds at $39 per ton	4 09
Bran, 105 pounds at $31.60 per ton	1 66
Skim-milk, 710 pounds at $4 per ton	1 42
Total	$13 49

STATEMENT OF FEED FROM BIRTH TO WEANING

Roots (mangels), 168 pounds at $3.18 per ton	$ 0 26
Skim-milk, 800 pounds at $4 per ton	1 60
Crushed oats, 171 pounds at $48 per ton	4 10
Middlings, 171 pounds at $39 per ton	3 33
Total	$ 9 29

STATEMENT OF COSTS

Boar service	$ 2 00
Feed to birth	13 49
Feed, birth to weaning	9 29
Total cost to weaning	$24 78
Average cost per pig to weaning (6·79 pigs per litter)	$ 3 64

ADVANCED REGISTRATION OF SWINE

This Station again co-operated with the Dominion Live Stock Branch and entered seven sows in the Advanced Registry policy for pure-bred swine. Five pigs from each sow were fed as individual groups on a uniform ration. In this test, the productive capacity of the sow is measured by the number of pigs weaned; early maturity is based on number of days from birth to slaughter;

quality is based on the suitability of the carcass for export. Thus, a check is maintained on all economic aspects having to do with production and quality. During the two years that this work has been conducted great progress has been made in building up the herd, thus proving that the system has merit.

Under tentative standards the score required for a sow to qualify is as follows:—

Production—40.
Maturity Index—100.
Slaughter Test—75.

The following table is the rating of the seven sows entered under the Advanced Registry policy in 1929:—

TABLE 6—RATING OF SOWS

Sow	Production	Maturity index	Slaughter test
XN	55	116	91
XS	35	115	90
XU	30	113	92
XX	55	116	75
XP	45	118	87
XT	45	114	89
XR	40	124	79
Average	43·5	116·5	86·1

Six of the seven sows in the test were first litter sows and two of them failed to qualify from a production standpoint. As regarding early maturity, the performance of all of the sows was strikingly good.

The following table indicates the performance of the four pigs from each litter from a live grading basis at the stockyards:—

TABLE 7—PERFORMANCE OF PIGS FROM DIFFERENT LITTERS

Sow	Weight of pigs	Grading	Age (birth to slaughter)
	lb.		days
XP 19	225	Select	174
	224	"	172
	217	"	176
	214	"	181
XR 19	215	"	170
	213	"	170
	220	"	170
	211	"	170
XN 19	222	"	182
	221	"	184
	220	"	184
	222	"	179
XS 19	222	"	183
	217	"	180
	215	Bacon	185
	219	Select	180
XT 19	217	Butcher	183
	220	Select	181
	215	"	183
	210	"	188
XX 19	223	Select	183
	224	"	185
	219	Butcher	180
	221	"	180
XU	218	Butcher	185
	216	Select	185
	212	"	185
	209	"	185

TABLE 8.—DAILY GAINS—FEED COST AND NET RETURNS OF FEEDER HOGS IN RECORD OF PERFORMANCE TEST

—	Group XP 19	Group XR 19	Group XN 19	Group XS 10	Group XT 19	Group XX 19	Group XU 19
Average daily gain..... lb.	1·56	1·57	1·52	1·47	1·44	1·49	1·39
Meal per pound gain..... lb.	2·79	2·44	2·76	3·06	2·92	3·09	2·96
Feed cost per 100 pounds gain..... $	6 88	6 12	7 34	7 53	7 21	7 55	7 89
Cash returns (5 pigs)..... $	134 25	131 19	134 95	132 19	123 29	130 80	127 85
Net returns (birth to finish)..... $	57 34	63 98	52 15	48 26	43 98	47 04	42 29
Average net return per pig $	11 47	12 79	10 43	9 65	8 79	9 41	8 46

FIELD HUSBANDRY

Field husbandry work during the year included production costs with hay, grain, root and ensilage crops, rotation experiments with three, four, five and six-year rotations, experiments with manure and fertilizer in the rotation, cultural experiments, rates of seeding oats and wheat, and dates of seeding oats.

The snowfall was light during the early part of the winter and fields were partly bare in January. Following the early part of February, fields were evenly covered with snow until the middle of March.

The spring was cold and backward. April and the first three weeks of May were cold. Four inches of snow fell on May 19. During this month the precipitation was 5·03 inches as compared with an average of 2·54 inches. The cold, wet weather during this month resulted in spring work being greatly retarded. A little ploughing was done on May 9. The first dates of seeding under field conditions were: wheat—May 17; oats—May 29; barley—May 27; potatoes—June 3; sunflowers—June 11; corn—June 4.

Grasses and clovers wintered well and the abundant rainfall in May gave hay and pasture crops a good start. Precipitation in June was less than average, but hay grew well. Grain, which was sown later than usual, did not grow so well. The rainfall in July was slightly above the average. Frequent showers during the early part of this month materially aided growing conditions. Following this period the precipitation for the balance of July, August and September was less than usual. Haymaking and harvesting were done under very favourable weather conditions. The hay crop at the Station was good. Grain was a light crop with short straw. Corn grew well but roots were retarded by the dry summer weather. Potatoes were a fairly good crop, due in part to the absence of blight. Pastures were good in the early season but growth was slow during the latter part of the summer.

The six-year rotation of hoed crop, grain, hay, hay, hay and grain, begun in 1927, is being continued with good satisfaction in our general farm rotation. In this rotation, barnyard manure supplemented with commercial fertilizer is applied for the hoed crop and barnyard manure at the rate of eight tons per acre is applied as a top dressing after the second-year hay crop is removed.

CROP PRODUCTION COSTS

All materials and operations in the crop production tables are charged at the 1929 prices, which are:—

Rent and taxes	$3 00 per acre
Machinery	2 85 per acre
Manure	1 50 per ton
Nitrate of soda	2 65 per cwt.
Sulphate of ammonia	2 70 per cwt.
Superphosphate	0 975 per cwt.
Muriate of potash	2 05 per cwt.
Mixing fertilizer	2 00 per ton
Timothy	11 25 per cwt.
Red clover	35 00 per cwt.
Alsike clover	31 00 per cwt.
Alfalfa	37 00 per cwt.
Oats	1 35 per bushel
Swedes	0 80 per pound
Barley	1 75 per bushel
Peas	4 00 per bushel
Sunflowers	0 09¾ per pound
Mangels	0 35 per pound
Potatoes	1 00 per brl.
Twine	0 17 per pound
Wheat	2 00 per bushel
Manual labour, teamster and tractor operator	0 25 per hour
Horse labour	0 10 per hour
Threshing oats	0 08 per bushel
Threshing wheat, barley	0 10 per bshel

Field crops were valued as per monthly bulletin of Agricultural Statsitics:—

Hay	$12 16 per ton
Oats	0 76 per bush.
Potatoes	1 44 per cwt.
Barley	1 06 per bush.

The cost of manure and fertilizer is distributed to the various crops in the rotation on the following basis:—

TABLE 9.—MANURE AND FERTILIZER

—	Three-year rotation		Four-year rotation		Six-year rotation	
	Manure	Fertilizer	Manure	Fertilizer	Manure	Fertilizer
	%	%	%	%	%	%
1st crop	50	60	40	55	40	55
2nd crop	30	30	30	30	25	30
3rd crop	20	10	20	10	20	10
4th crop	.....	.....	10	5	10	5
5th crop	.....	.....	.....	.....	5	.....
6th crop	.....	.....	.....	.....	.....	.....

HAY—COST OF PRODUCTION IN A SIX-YEAR ROTATION

Haymaking was begun July 7 for odd lots and July 17 for main crop and finished on August 1, the total crop being 177·71 tons on the farm proper and 16·32 tons from the Hodson farm.

Records of the cost of producing hay were kept from the first, second and third crops in a six-year rotation of hoed crop, grain, hay, hay hay and grain. A share of the manure and fertilizer applied for the rotation was charged to the crop as previously noted. All of the red clover used in the seeding down was charged to the first-year hay crop. Timothy, alsike and alfalfa were proportionately charged to the three hay crops in the rotation. The results are shown in table 10.

TABLE 10.—COST PER ACRE OF PRODUCING HAY IN A SIX-YEAR ROTATION

—	1st-year hay		2nd-year hay		3rd-year hay	
	1929	Average, 1927, 1928, 1929	1929	Average, 1927, 1928, 1929	1929	Average, 1928, 1929
Rent and taxes ..... $	3 00	3 00	3 00	3 00	3 00	3 00
Manure ..... $	4 50	6 16	3 00	3 00	5 92	6 91
Fertilizer ..... $	0 62	0 87	0 44	0 57	.....	.....
Seed ..... $	3 13	2 31	1 03	1 61	1 03	1 42
Machinery ..... $	2 85	2 85	2 85	2 85	2 85	2 85
Manual labour ..... $	3 54	3 56	3 57	3 47	2 81	3 02
Horse labour ..... $	1 03	0 96	0 89	0 89	0 82	1 00
Statement of Yield and Cost						
Total cost per acre ..... $	18 67	19 73	14 78	15 4	16 43	18 21
Yield per acre hay ..... tons	2 50	2 14	2·33	2·25	2·21	2·48
*Yield per acre dry matter ..... tons	2·00	1·71	1·86	1·80	1·76	1·98
†Average digestibility ..... %	55·00	55·00	55·00	55·00	55·00	55·00
Total yield per acre digestible nutrient ..... tons	1·10	0·94	1·02	0·98	0·96	1·09
Cost per ton hay ..... $	7 46	9 38	6 34	6 84	7 43	7 33
Cost per ton dry matter ..... $	9 33	11 72	7 94	8 56	9 33	9·19
Cost per ton digestible nutrient ..... $	16 97	21 28	14 49	15 63	17 11	16 75

* Assuming that hay contains 80 per cent dry matter.
† Clover and timothy, Table 2, "Feeds and Feeding," Henry and Morrison, 1923 edition.

Location of fields—

First year hay—Wilsey field—12 acres.
Second year hay—Boyce field—13 acres.
Third year hay—New land field—11 acres.

Notes on Results

In the first year hay, red clover and alsike predominated. A fairly good stand of second crop clover developed. Part of this was cut for ensilage and part was left uncut. No credit is given for this second crop.

The second year hay crop was largely timothy with a little red clover and alsike and a bottom of white dutch clover.

The third year hay crop was largely timothy with other grasses.

First year hay produced 2·5 tons per acre at a cost of $7.46 per ton. The average cost for three years is $9.38.

Second year hay produced 2·33 tons per acre at a cost of $7.94 per ton. The average cost for three years is $6.84.

Third year hay produced 2·21 tons per acre at a cost of $7.43 per ton. The average cost for two years is $7.33.

OATS—COST OF PRODUCTION IN A SIX-YEAR ROTATION—(1) FOLLOWING HOED CROP

A 10¾-acre field, which was in hoed crop in 1928, was sown to Victory oats May 27-30. Fifteen tons of manure were applied for the hoed crop in 1928 along with 400 pounds of 2-12-5 fertilizer. Four hundred pounds of the same fertilizer were applied in this field in 1927 for the grain crop. This crop was very weedy. Straw was not heavy and the yeild of grain was below average. Harvesting was done under favourable conditions on September 11. The results, as well as the average to date, are shown in table 11.

TABLE 11.—COST PER ACRE OF PRODUCING OATS FOLLOWING HOED CROP

Item		Oats			
		1927	1928	1929	Average three years
Rent and taxes	$	3 00	3 00	3 00	3 00
Manure	$	10 00	7 50	5 62	7 70
Fertilizer	$	2 58	1 76	2 16	2 16
Seed	$	4 50	4 50	4 05	4 35
Machinery	$	2 85	2 85	2 85	2 85
Twine	$	0 44	0 44	0 43	0 43
Manual labour	$	5 46	5 97	5 06	5 49
Horse labour	$	3 39	3 66	3 09	3 38
Tractor	$	.....	.....	0 82	0 27
Threshing	$	3 14	3 40	2 45	2 99
Statement of Yield and Cost					
Total cost per acre	$	35 36	33 08	29 53	32 65
Yield per acre grain	bush.	39·2	42·49	30·7	37·46
Yield per acre grain	ton	0·67	0·72	0·52	0·63
Yield per acre straw	ton	1·07	0·93	0·53	0·84
Value of straw at $4 per ton	$	4 28	3 72	21 2	3 37
Cost of grain per acre, considering value of straw	$	31 08	29 36	27 41	29 28
*Dry matter	%	90·8	90·8	90·8	90·8
Yield grain per acre dry matter	ton	0·608	0·654	0·472	0·578
†Average digestibility of grain	%	70·0	70·0	70·0	70·0
Yield grain per acre digestible nutrient	ton	0·426	0·458	0·330	0·404
Cost per bushel grain	$	0·793	0·691	0·881	0·788
Cost per ton grain	$	46 39	40 78	52 71	46 62
Cost per ton dry matter in grain	$	51 12	44 89	58 07	51 36
Cost per ton digestible nutrient in grain	$	72 96	64 10	83 06	73 37

* Oats, table 1, "Feeds and Feeding", Henry and Morrison, 1923 edition.
† Oats, table 2, "Feeds and Feeding", Henry and Morrison, 1923 edition.

OATS—COST OF PRODUCTION IN A SIX-YEAR ROTATION—(2) FOLLOWING THIRD-YEAR HAY

A field of 18·55 acres, which had produced three crops of hay, was sown to Victory oats on June 11. Straw was not heavy and the yield, while better than in the field following hoed crop, was below the average. Ripening in this field was uneven. Harvesting was done from September 13 to 21. The results are shown in table 12.

TABLE 12.—OATS—COST OF PRODUCTION IN A SIX-YEAR ROTATION FOLLOWING THE HAY CROP

Rent and taxes	$	3 00
Manure	$	3 00
Seed	$	4 05
Machinery	$	2 85
Twine	$	0 43
Manual labour	$	5 13
Horse labour	$	2 83
Tractor labour	$	1 38
Threshing	$	2 92
Statement of Yield and Cost		
Total cost per acre	$	25 59
Yield per acre grain	bush.	36·5
Yield per acre grain	tons	0·62
Yield per acre straw	tons	0·465
Value of straw at $4 per ton	$	1 86
Cost of grain per acre, considering value of straw	$	23 73
*Dry matter	%	90·8
Yield grain per acre dry matter	tons	0·562
†Average digestibility of grain	%	70·0
Yield grain per acre digestible nutrient	tons	0·393
Cost per bushel grain	$	0·657
Cost per grain ton	$	38 27
Cost per ton dry matter in grain	$	42 22
Cost per ton digestible nutrient in grain	$	60 38

* Oats, table 1, "Feeds and Feeding", Henry and Morrison, 1923 edition.
† Oats, table 2, "Feeds and Feeding", Henry and Morrison, 1923 edition.

COST OF PRODUCING SUCCULENT FEED

Four acres were sown to Ditmar swedes on June 19-20. These were sown on land which had been in hay for the previous two years and which previous to that was newly broken. Soil was a medium clay loam. Fifteen tons of barnyard manure had been applied as top dressing in 1927 for the 1928 hay crop. Eighteen tons of barnyard manure were applied as a top dressing in the spring of 1929. Five hundred tons of 2-12-5 commercial fertilizer were applied broadcast for the turnip crop. Growth during the summer was slowed up on account of the dry weather, which together with the late planting resulted in a crop below the average. A statement of the costs, as well as the average since 1927, is shown in table 13.

TABLE 13.—COST PER ACRE OF PRODUCING SWEDES

—	Swedes			
	1927	1928	1929	Average, 1927, 1928, 1929
Rents and taxes.....$	3 00	3 00	3 00	3 00
Manure.....$	12 00	12 00	16 43	13 47
Fertilizer.....$	3 24	4 34	3 72	3 76
Seed.....$	1 60	2 00	2 00	1 86
Machinery.....$	2 85	2 85	2 85	2 85
Manual labour.....$	36 19	42 08	30 31	36 19
Horse labour.....$	7 75	8 51	6 68	7 64
Tractor labour.....$	.....	.....	2 80	0 93
Statement of Yield and Cost				
Total cost per acre.....$	66 63	74 78	67 79	69 73
Total yield per acre.....ton	24·56	23·53	16·79	21·62
Dry matter.....%	9·91	11·04	10·10	.....
Total yield per acre dry matter.....ton	2·43	2·60	1·69	2·24
*Average digestibility.....%	87·0	87·0	87·0	87·0
Total yield per acre digestible nutrient.....ton	2·11	2·26	1·47	1·94
Cost per ton green weight.....$	2 71	3 18	4 03	3 30
Cost per ton dry matter.....$	27 42	28 76	40 11	32 09
Cost per ton digestible nutrient.....$	31 58	33 09	46 11	36 92

* Rutabaga, Table 2, "Feeds and Feeding", Henry & Morrison, 1923 edition.

VICTORY OATS—DATES OF SEEDING

Dates of seeding experiments were carried on with Victory oats sown May 29, June 8, and June 18. The soil was a medium clay loam which had been in potatoes the previous year. Plots were 470 feet long and 13 drills wide. The results are shown in table 14.

TABLE 14.—VICTORY OATS—DATES OF SEEDING

Date of Seeding	Number of days from seeding to harvest	Yield per acre	
		Grain	Straw
		bush.	tons
May 29, 1929.....	103	41·67	0·97
June 8, 1929.....	100	35·20	0·65
June 18, 1929.....	93	31·61	0·83

This experiment has been carried on for five years. The average results are shown in table 15.

TABLE 15.—VICTORY OATS—DATES OF SEEDING

Year	First Seeding			Second Seeding			Third Seeding		
	Number of days seeding to harvest	Yield per acre		Number of days seeding to harvest	Yield per acre		Number of days seeding to harvest	Yield per acre	
		Grain	Straw		Grain	Straw		Grain	Straw
		lb.	lb.		lb.	lb.		lb.	lb.
1925	105	2,380·0	2·964·0	100	2,475·0	3,825·0	94	2,250·0	4,550·0
1926	106	1,948·0	2,649·0	98	2,066·0	3,434·0	101	1,759·0	3,766·0
1927	108	1,238·0	2,583·0	114	1,125·0	3,200·0	108	638·0	2,563·0
1928	102	1,200·0	4,150·0	111	1,125·0	4,775·0	104	963·0	3,188·0
1929	103	1,417·0	1,943·0	100	1,197·0	1,307·0	93	1,075·0	1,674·0
Average	104	1,636·6 bush.	2,857·8 tons	104	1,597·6 bush.	3,308·2 tons	100	1,337·0 bush.	3,148·2 tons
Average		48·13	1·42		46·98	1·65		39·32	1·57

ROTATION EXPERIMENTS

In 1924 a series of rotation experiments was begun. These have been carried on continuously since that time. The soil is a medium clay loam and the area of each plot is one-third of an acre. In three of the rotations, the plots are divided to include different crops and different fertilizer treatments.

A summary of the average annual profit or loss per acre for these rotations is shown in table 16.

TABLE 16.—SUMMARY OF ROTATION EXPERIMENTS FOR SIX YEARS

Rotation	Crops	Fertilizer treatment—Rate per acre	Average annual profit or loss per acre
5 year	Potatoes, barley, hay, hay, oats	12 tons manure for hoed crop 8 tons manure on barley stubble	11 58
6 year	Sunflowers, barley, hay, hay, hay, oats.	15 tons manure for sunflowers 9 tons manure for first hay crop	— 0 42
3 year	Sunflowers, oats, clover	12 tons manure for sunflowers	—7 21
3 year	Potatoes, oats, clover	12 tons manure for potato crop	18 89
3 year	Potatoes, oats, clover	12 tons manure for potato crop	16 43
3 year	Potatoes, oats, clover	12 tons manure for potato crop plus 100 pounds nitrate of soda, 350 pounds superphosphate and 100 pounds muriate of potash.	20 26
4 year	Potatoes, oats, hay, hay	16 tons manure for potato crop	18 90
4 year	Oats, hay, hay, hay	No manure nor fertilizer	0 55
4 year	Oats, hay, hay, hay	8 tons manure on oat stubble and 8 tons manure after second hay crop.	—0 68
4 year	Oats, hay, hay, hay	100 pounds nitrate soda, 125 pounds super-phosphate, 25 pounds muriate potash for each hay crop.	5 87

HORTICULTURE

TREE FRUITS

The winter of 1928-29 was a moderate one, and the orchard wintered in good condition. Bloom was heavy on most varieties, but owing to the unfavourable weather conditions during the blossoming period, the set of fruit was not as great as otherwise would have been the case. The set was such on some varieties as to make thinning unnecessary and early season prospects for a good crop were not very encouraging. However, late season observations showed most trees to be carrying a normal crop. Most varieties sized well and an average crop of fruit was produced. The colour was good and the entire crop was exceptionally free from scab.

ORCHARD FERTILIZER TREATMENT

Orchard Fertilizer Experiments, begun in previous years, were continued and will be reported at a later date. Trees not in these experiments were given an application of 5 pounds nitrate of soda, 2 pounds acid phosphate and 1 pound muriate of potash.

ORCHARD SPRAY EXPERIMENT

A block of Fameuse and McIntosh in the cultural orchard was again used for a spraying experiment, comparing 4 Spray Calendars for the control of apple scab and insect pests and carried on in co-operation with the Entomological Branch. Eight rows of trees were used, the experiment being laid off in duplicate, one row to the plot, so that each spray treatment was represented on both sides of the orchard. One tree of each variety was left untreated to serve as a check.

The spray treatments for the different plots were as follows:—

Plot 1.—Two pre-blossom and three after-blossom applications of 3-10-40 Bordeaux, the first three applications to be plus 1½ pounds arsenate of lime to 40, the fourth plus 1 pound arsenate of lime to 40 gallons water, and the fifth to be without poison;

Plot 2.—Two pre-blossom sprays of 3-10-40 Bordeaux plus 1½ pounds arsenate of lime, one (immediately) after-blossom application of 1 gallon lime-sulphur, 3½ pounds aluminium sulphate and 1 pound arsenate of lime to 40 gallons water, and two after-blossom applications of 3-10-40 Bordeaux, the first plus 1 pound arsenate of lime and the last without poison. The first after-blossom Bordeaux spray follows the sulphur spray in two weeks and the second after-blossom Bordeaux to be applied depending on weather conditions and scab infection;

Plot 3.—Five sprays of 3·76 pounds of copper carbonate and ½ pint of nicotine sulphate to 40 gallons of water;

Plot 4.—Five sprays of 3·76 pounds of copper carbonate and 1½ pounds arsenate of lead;

Plot 5.—Check (several trees left untreated).

(NOTE.—Due to injury caused by the materials in Plots 3 and 4, a 3-10-40 Bordeaux was used on Plots 3 and 4 for the 5th application).

OBJECTS

(1) To compare the above spray calendars for the control of insect pests and apple scab;
(2) To determine the possibility of copper carbonate replacing Bordeaux in orchard spraying;
(3) To determine if copper carbonate would cause russeting of the fruit such as is sometimes caused by Bordeaux.

The application dates, tree periods and weather conditions are given in table 17.

TABLE 17.—APPLICATION DATES, TREE PERIODS AND WEATHER CONDITIONS

Application.	Date	Tree period	Weather		
			Before	During	After
1st.....	May 9....	Early semi-dormant.....	Fine and windy.	Fine and windy.	Fine and windy.
2nd.....	May 23....	"Macs" buds showing pink tips.....	Fine and windy.	Fine and windy.	Fine and windy.
3rd.....	June 10....	Petals both varieties practically all dropped.....	Fine	Fine	Fine
4th.....	June 25....	2nd after-blossom.....	Fine	Fine	Fine
5th.....	July 18....	3rd after-blossom.....	Fine	Fine	Fine

RESULTS.—The copper carbonate sprays caused a heavy drop of foliage and an unhealthy appearance of the leaves remaining on the trees. The remaining leaves were also smaller in size as a general rule than the foliage on the checks. This foliage injury was so noticeable after the 4th application that 3-10-40 Bordeaux was used on these plots for the 5th spray.

A trace of typical lime sulphur injury was noted on plot 2 following the application of lime sulphur-aluminium sulphate mixture (1st after-blossom). This injury was so slight that the trees recovered in a few days.

The russeting of the fruit on plot 1 was very severe, especially on the variety "McIntosh Red", while on plot 2 the russeting could not be categoried as more than moderate. On plots 3 and 4 the fruit showed every bit as much russeting as on plot 1.

The percentages of scab and insect injury for the five different treatments in duplicate series are given in table 18.

Table 18.—Spraying Results with Bordeaux and Copper Carbonate

Variety	Plot No.	Spray treatment	Per cent scab					Per cent insect injury			
			Clean	Light scab	Heavy scab	Crack scab	Total scab	Codling moth	Fruit worms	Bud moth	Total insect injury
			%	%	%	%	%	%	%	%	%
McIntosh	1	Bordeaux (3-10-40) 1st, 2nd, 3rd, 4th, 5th	84·8	1·7	0·2	0·0	1·9	0·0	12·1	1·5	13·5
"	2	Bordeaux (3-10-40) 1st, 2nd, 4th, 5th ; Bordeaux-aluminium sulphate 3rd.	91·7	0·9	0·1	0·0	1·0	0·0	5·8	1·4	7·2
"	3	Copper carbonate-nicotine sulphate 1st, 2nd, 3rd, 4th; Bordeaux (3-10-40) 5th	84·9	2·9	0·6	0·1	3·6	0·0	10·4	1·0	11·4
"	4	Copper carbonate-arsenate of lead, 1st, 2nd, 3rd and 4th; Bordeaux (3-10-40) 5th.	90·1	10·7	1·8	0·1	12·6	0·0	7·0	1·6	8·7
"	5	Unsprayed	–	–	–	–	100·0	–	–	–	–
Fameuse	1	Bordeaux (3-10-40) 1st, 2nd, 3rd, 4th, 5th	80·0	0·4	0·4	0·3	1·1	0·0	16·7	3·1	19·8
"	2	Bordeaux (3-10-40) 1st, 2nd, 4th, 5th ; Bordeaux-aluminium sulphate 3rd.	92·6	0·2	0·0	0·0	0·2	0·0	4·2	2·3	6·5
"	3	Copper carbonate-nicotine sulphate 1st, 2nd, 3rd, 4th; Bordeaux (3-10-40) 5th	87·8	1·5	0·3	0·0	1·8	0·1	7·9	2·2	10·2
"	4	Copper carbonate-arsenate of lead 1st, 2nd, 3rd and 4th; Bordeaux (3-10-40) 5th.	94·5	0·4	0·0	0·0	0·4	0·0	3·2	2·0	5·2
"	5	Unsprayed	47·3	24·8	0·0	0·0	24·8	2·9	18·5	11·7	33·1
Average of both varieties.	1	Bordeaux (3-10-40) 1st, 2nd, 3rd, 4th, 5th	82·4	1·0	0·3	0·1	1·4	0·0	14·4	2·3	16·7
	2	Bordeaux (3-10-40) 1st, 2nd, 4th, 5th ; Bordeaux-aluminium sulphate 3rd.	92·1	0·5	0·1	0·0	0·6	0·0	5·0	1·8	6·8
	3	Copper carbonate-nicotine sulphate 1st, 2nd, 3rd, 4th; Bordeaux (3-10-40) 5th.	86·3	2·2	1·5	0·C	3·7	0·0	9·1	1·6	10·7
	4	Copper carbonate-arsenate of lead 1st, 2nd, 3rd and 4th; Bordeaux (3-10-40) 5th.	87·3	10·5	1·1	0·0	11·6	0·0	5·1	1·8	6·9
	5	Unsprayed									

Note.—McIntosh and Fameuse checks were located in only one series of the experiment.
Figures for Fameuse, Plot 4, are based on one series only, as there were no apples on the duplicate series.
The fruit of the McIntosh check was 100 per cent affected with heavy and cracked scab. So much of the fruit surface was thus affected as to make it impossible in most cases to detect insect injury.

DISCUSSION.—Since the copper carbonate plots gave so much foliage injury and russeting of fruit, this material cannot be considered as a possible substitute for Bordeaux in orchard practice.

Whereas plot 1 in both series of each variety shows a marked inferiority in insect control, especially in the control of fruit worms, to plot 2 and since both received the same sprays with the exception of the first after-blossom application, it would appear that the mixture of lime sulphur and aluminium sulphate plus 1 pound of arsenate of lime to 40 gallons for the immediately after-blossom application is far superior for insect control; at least to the 3-10-40 Bordeaux plus 1½ pounds arsenate of lime. Apparently, Bordeaux reduces the insecticidal value of arsenate of lime very materially.

There is also a slight margin in favour of the after-blossom spray of lime sulphur-aluminium sulphate mixture over the 3-10-40 Bordeaux for fungicidal purposes. In both series of each variety the calendar with the mixture used in the after-blossom application gave a slightly better control of apple scab.

CONCLUSIONS.—That the calendar outlined as plot 2 is superior to a straight calendar of Bordeaux mixture for

(1) Insect control,
(2) Scab control,
(3) Freedom from russeting.

That copper carbonate cannot replace Bordeaux in orchard practice because of the injury to foliage and the russeting of the fruit caused by it.

That copper carbonate is not as good a fungicide as Bordeaux for control of apple scab.

VARIETY ORCHARD

This orchard is gradually being rid of varieties which have no commercial value in this province, and the blanks filled with new promising varieties worthy of test.

Melba, Lobo and Sandow fruited again and are still considered promising in their respective seasons. Sandow, especially, received considerable favourable mention at the Annual Meeting of the New Brunswick Fruit Growers' Association in February, 1930, and is by far the most promising winter variety of apple for New Brunswick that has come under our observation.

Lobo has not, as yet, been planted to any extent in New Brunswick, but will probably replace Wealthy, if future experiments confirm our 1929 findings that it is an excellent pollinator of McIntosh.

Joyce produced a good crop of high coloured fruit, but can only be considered as fair in quality.

The Cortland trees produced a few apples for the first time. The fruit is attractive in appearance, but not so good in quality as the Sandow. The latter is also a better keeper.

PRODUCTION OF A WINTER APPLE FOR NEW BRUNSWICK

The production of a high quality winter apple, suitable for New Brunswick conditions, continues to be one of the most important lines of horticultural work at this Station. To this end, aproximately 3,000 trees were set out in the spring of 1929 in their permanent positions in the seedling orchard. These trees were one and two years of age and were open pollinated seedlings of the following varieties: McIntosh, Lobo, Sandow, Golden Russet, Bethel, Donald, Elmer, Glenton, Marcus, Emilia, Rocket and Thurso.

Additions will be made to this orchard as opportunity permits. During the past summer, seeds were saved from numerous controlled pollinations, and in time, will furnish further valuable material for this orchard. In most of these

crosses, McIntosh was used as the female parent. The male parents included Yellow Transparent, Dudley, Wealthy, Lobo, Alexander, Wolf River, Fameuse, Gravenstein, Rome Beauty, Golden Russet and Sandow. In other crosses, Lobo and Sandow were used as the female parents with McIntosh furnishing the pollen.

Steps were also taken to propagate the Sandow variety, which as previously mentioned, is a promising winter variety of apple for New Brunswick. Approximately 500 root grafts of this variety were made during the winter. These will be grown for two years in the Station nursery, and then distributed among reputable growers throughout the province. In this way, it is hoped to gain reliable information concerning the hardiness of this variety, the cropping characteristics and the quality of fruit produced.

THINNING EXPERIMENT WITH APPLES

The thinning of apples is a very necessary orchard practice if a high quality crop is going to be obtained. The amount of thinning desirable is dependent upon many factors and must be modified to suit such considerations as the variety, the individual condition of the tree, the habit of bearing, the season, pruning, and the local market requirements.

Owing to the many outside factors which enter into an experiment such as this, conclusions cannot be based on one year's work alone, unless it is replicated many times. Even then, seasonal conditions may be such as to make the results misleading. For this reason, this experiment is to be carried on over a period of years and full results will be published at a later date.

During the past summer, the Wealthy variety was used for the major part of the experiment. Two series of three trees each were selected, one in each series being left unthinned, another thinned to 4 inches between the fruits, and the third thinned to 8 inches between the fruits. Thus, all results quoted are the average of the performance of two trees. These trees were selected on the basis of uniformity of size, vigour, load of fruit they were carrying, and previous year's crop record.

Every fruit was calipered by hand and put into its proper commercial grade. Data relating to yield, percentages and average sizes of different grades are contained in table 19.

TABLE 19.—WEALTHY THINNING RESULTS

Wealthy		Thinned to 8 inches between fruit	Thinned to 4 inches between fruit	Unthinned
Date of thinning		July 25	July 25	
Number of trees in test		2	2	2
Average total yield per tree	brl.	1·49	1·67	2·21
Average yield of No. 1's per tree	brl.	1·04	0·70	0·35
Average number of No. 1's per tree		505	384	200
Average yield of No. 1's, 2's and D's per tree	brl.	1·44	1·46	1·32
Average yield of No. 3's and culls per tree	brl.	0·05	0·21	0·89
Percentage of No. 1's	%	70	42	16
Percentage of No. 2's	%	13	32	41
Percentage of Domestics	%	14	13	3
Percentage of No. 3's	%	3	11	31
Percentage of culls	%	0	1	9
Average size of entire crop	in.	2 19/32	2 15/32	2 9/32
Average size of No. 1's	in.	2 22/32	2 20/32	2 19/32
Average size of No. 2's	in.	2 13/32	2 12/32	2 11/32
Average size of Domestics	in.	2 20/32	2 19/32	2 18/32
Average size of No. 3's	in.	2 5/32	2 5/32	2 4/32
Average size of culls	in.	1 27/32	1 28/32	1 28/32

It is evident from these results that thinning is an essential practice, at least with the Wealthy variety, if a crop with a high percentage of No. 1's is to be produced. The increase in the average size of the crop as the result of thinning is a very significant feature and clearly indicates the marked improvement in the quality of total crop produced. Not only is the yield of No. 1's greatly increased, but the quality of same is also correspondingly improved, resulting in a product that would sell at a premium if marketed in any considerable quantity.

Total yield is decreased by thinning owing to the great reduction in the amount of No. 3 and cull fruit produced; grades, however, which seldom, if ever, net the grower sufficient returns to pay for their cost of production. If No. 3's are ever excluded from the market, the value of thinning will be so self-evident that its practice will become much more universal than at the present time, and thinning will be considered one of the essential operations in successful orchard management.

No statement is presented as to the actual profit resulting from the operation of thinning. This will be published at a later date after more data accumulates.

The McIntosh variety was also used in some thinning experiments in which branches instead of trees formed the unit for the various rates of thinning. Results based on observations throughout the season would indicate that even a variety such as McIntosh benefits from fairly heavy thinning.

STUDIES IN APPLE POLLINATION

Pollination of the McIntosh Variety.—During the past year apple pollination studies were commenced, upon the suggestion of the New Brunswick Fruit Growers' Association, with the object of obtaining some definite pollination data concerning the leading commercial varieties of apples grown in New Brunswick. As there has been considerable difficulty in obtaining satisfactory sets of fruits with the McIntosh variety in many orchards, work was concentrated in determining the relative suitability of some of our common varieties as pollinators of McIntosh. The varieties used for this purpose were Dudley, Wealthy, Alexander, Lobo, Fameuse, and McIntosh. In order to reduce the possibility of error, due to individuality of trees, to a minimum, pollen from the above-mentioned varieties was applied to each of five McIntosh trees, except where otherwise mentioned, using approximately the same number of blossoms for each kind of pollen. This was considered preferable to applying Dudley pollen to one tree, Wealthy to another, and so on. In addition, a check of the same number of blossoms was left on each tree to be pollinated by natural agencies and serving as a check on the hand-pollination work.

All flower clusters were thinned to two blossoms and the pollination work was done under the Sax method, whereby blossoms are emasculated but not bagged.

The results of this experiment are given in table 20.

TABLE 20—A COMPARISON OF SIX VARIETIES OF APPLES AS POLLINATORS OF THE McINTOSH

Female parent	Male parent	Number blossoms pollinated	Early set, June 26		Late set, Sept. 20		Seed content	
			Number fruits set	Per cent set	Number fruits maturing	Per cent maturing	Number apples	Number seeds per fruit
McIntosh.....	McIntosh....	212	0	0·0	0	0·0	.....	.....
"	Wealthy.....	212	8	3·8	5	2·4	5	2·2
"	*Alexander....	178	86	48·3	22	12·4	22	3·3
"	*Fameuse.....	186	84	45·2	28	15·1	28	4·7
"	Dudley.....	222	106	47·7	39	17·6	32	5·5
"	Lobo.....	205	109	53·2	42	20·5	42	5·6
"	Open-pollinated Check	202	103	51·0	46	22·8	40	4·9

*Results based on only 4 trees.

In the number of fruits reaching maturity, the open pollinated check leads with a set of 22·8 per cent, and is followed in order by Lobo, Dudley, Fameuse, Alexander, Wealthy, and McIntosh with percentage sets of 20·5, 17·6, 15·1, 12·4, 2·4 and 0·0 respectively. These results, although not conclusive, being based on only one year's work, are at least suggestive, and the higher positive results are a fairly safe index of the relative value of these varieties as pollinators of the McIntosh. The fact that Lobo, an open pollinated seedling of McIntosh, gave the highest per cent set is very interesting both on account of the fact that it is a seedling of McIntosh and also because of the possible practical bearing on fruit growing in this province. If future investigations confirm these findings, it is quite possible that Lobo will replace Wealthy in New Brunswick plantings, as the chief reason for planting Wealthy at the present time is the current belief that it is a good pollinator of McIntosh. This is contrary to our findings, but owing to the numerous factors which may cause low sets, unfavourable results, such as this, based only on one year results, are not at all conclusive, and much further investigation is necessary before Wealthy can be condemned for this reason alone.

Alexander, giving only a set of 12·4 per cent, merits an extra word of explanation. Summer observations revealed the fact that on one tree a branch carrying the blossoms pollinated by the Alexander pollen made very weak growth, and seemed to be in a generally unhealthy condition. From the twenty-four blossoms pollinated on this branch not a single fruit matured. Omitting this branch from the calculations, as would seem advisable under the circumstances, gives Alexander a set of 14·2 per cent, thus ranking it fairly closely to Fameuse as a pollinator of McIntosh.

The McIntosh variety was proven to be self-unfruitful, as McIntosh pollen resulted in a 0·0 per cent set, although in the count on June 26 a slight enlargement of the calyx was noted on two of the 212 blossoms.

CONCLUSIONS.—(1) The McIntosh variety is self-unfruitful and must be interplanted with other varieties to ensure proper pollination.

(2) Our one year's results indicate that two of the best varieties for this purpose are Lobo and Dudley.

INTER-FERTILITY OF MCINTOSH WITH LOBO AND SANDOW

As the McIntosh is the leading commercial apple grown in New Brunswick, and the Lobo and Sandow are promising varieties, investigations were commenced to determine the inter-fertility of these varieties. Reciprocal crosses were made between McIntosh and Lobo and McIntosh and Sandow, employing the same technique as in the other pollination studies. The results are given in table 21.

TABLE 21.—INTER-FERTILITY OF McINTOSH WITH LOBO AND SANDOW

Female parent	Male parent	Number trees used	Number blossoms pollinated	Early set, June 26		Late set, Sept. 20		Seed content	
				Number fruits set	Per cent set	Number fruits maturing	Per cent maturing	Number apples	Number seeds per fruit
McIntosh	Lobo	5	205	109	53·2	42	20·5	42	5·6
Lobo	McIntosh	1	150	111	74·0	33	22·0	25	8·1
McIntosh	Sandow	2	78	33	42·3	22	28·2	.....	.....
Sandow	McIntosh	1	146	20	13·7	16	11·0	.....	.....

From the above results it is evident that Lobo and McIntosh will readily pollinate each other. In fact, it would seem that McIntosh is an exceptionally good pollinator of Lobo, giving a set on June 26 of 74 per cent. During the summer, one of the branches was badly broken and a number of the fruits broken off. Just how many were removed could not be determined, and hence, no allowance whatever is made in reckoning the per cent reaching maturity. If this branch were omitted in the calculations, the per cent reaching maturity would read 31·2 instead of 22. Sandow pollen also proved effective on McIntosh blossoms, giving a set at maturity of 28·2 per cent. The lateness of bloom of this variety will lessen its value, under field conditions, as a pollinator of the McIntosh. There is, however, sufficient overlapping in the bloom period of these varieties to give it considerable value as a pollinator in the latter part of the bloom period of McIntosh.

The reciprocal cross did not prove nearly so effective, McIntosh pollen on Sandow blossoms giving only a 11 per cent set.

SMALL FRUITS

STRAWBERRY BREEDING

The development of a late variety of strawberry, suitable to our climatic conditions, would prove a distinct boon to the strawberry industry in New Brunswick. At the present time the New Brunswick crop comes on the market just after the peak of the Ontario and United States crop is reached. This gives local growers a considerable advantage, which, however, would be greatly increased if a satisfactory variety could be introduced which would lengthen our present season by at least several days. The production of such a variety is the object of our strawberry breeding work.

To this end a collection of some of the leading late varieties of strawberries grown in America was made in the spring of 1929. These are being propagated at the present time and include the following varieties: Ananas de Grieniel, Aroma, Big Late, Booster, Burgess, Chesapeake, Gandy, Lupton, McAlpin, New York, Nick Ohmer, Orem, Sample, Stevens Late, and Wm. Belt. These varieties, along with several possible additions, will form the basis of the breeding work, in which numerous crosses will be made in an attempt to produce the desired berry. What is being sought is a variety equal to or better in shipping quality, colour, size, and yield than the best on the market now, but several days later in season.

VEGETABLE GARDENING

PAPER MULCH VERSUS CLEAN CULTIVATION FOR VEGETABLES AND SMALL FRUITS

This experiment consisted of the growing under mulch paper, Gator Hide, Grade A, in comparison with ordinary earth culture of 18 different kinds of vegetables. These vegetables were grown in duplicate 30-foot rows, and the

results given in the accompanying table are in terms of straight percentage of increased or decreased yields, as the case may may be, due to the use of mulch paper, and based on yields from 30-foot rows unless otherwise mentioned.

TABLE 22—PAPER MULCH VERSUS CLEAN CULTIVATION FOR VEGETABLES

Vegetable	Variety	Specific portion of crop	Increase due to mulching
			%
Beans	Round Pod Kidney Wax	Green beans	3
"	Round Pod Kidney Wax	Ripe beans	55
"	Stringless Green Pod	Green beans	5
"	Stringless Green Pod	Ripe beans	34
Beets	Detroit Dark Red	Crop harvested as bunch beets	12
"	Detroit Dark Red	Crop allowed to mature until fall	27
Carrots	Chantenay	Crop harvested as bunch carrots	14
"	Chantenay	Crop allowed to mature until fall	29
Celery	Golden Plume	Marketable crop	2
Corn	Golden Bantam	Marketable crop	8
Cucumber	Harris Perfection	Early crop during month of August	122
		Total crop	72
Egg Plant	Extra Early Dwarf	Mature crop	133
Lettuce	All Heart	Marketable crop	19
Muskmelon	Hearts of Gold	Ripe melons	300
Onions	Yellow Globe Danvers	Crop over 2 ins. in diameter	2
"	" "	Crop under 2 ins. in diameter	222
Pepper	Harris Earliest	Ripe fruit	−8
"	Harris Earliest	Green fruit	−3
Potatoes	Irish Cobbler	Early digging—Marketable crop	1
"	Irish Cobbler	Late digging "	10
"	Green Mountain	Early digging "	−3
"	" "	Late digging "	11
Spinach	King of Denmark	Marketable crop	4
Tomatoes	Bonny Best	Ripe fruit for first 3 weeks of picking	79
"	"	Total ripe fruit for season	88
"	"	Green fruit	24

NOTE.—Cabbage and cauliflower records discarded owing to bad infestation of club root.

The one-year results indicate that many of our common garden vegetables respond favourably to the use of mulch paper with increased earliness of crop as well as larger yields. Muskmelon showed the greatest amount of benefit with a 300 per cent increase in yield, and was followed in order by egg plant, tomato and cucumber with increases in total yields of 133, 88 and 72 per cent respectively.

Beans.—Fifteen feet of each row picked as green beans; remaining half left to ripen and picked as dry beans.

Beets and Carrots.—Fifteen feet of each row pulled as bunch vegetables; remaining half left to mature until fall.

Celery.—Yields based on weights of twelve average plants.

Lettuce.—Yields based on weights of six average heads.

Spinach.—Yields based on weight of crop from 15-foot row.

The factor of increased earliness was pronounced with muskmelons and cucumbers. In muskmelons, the entire marketable crop may be considered as the early crop, as only the early crop has any chance of ripening under our conditions. With cucumbers, the early crop, namely, during the month of August, was increased 122 per cent as compared with a 72 per cent increase in the total crop.

Corn, although giving only an 8 per cent increase in total crop, came into tassel approximately four days earlier on the mulch paper plots, and in addition made considerably stronger vegetative growth. This combined with the fact

that the season of 1929 was an exceptionally favourable one for corn in New Brunswick, would indicate that in an ordinary season corn would give a much greater response to the use of mulch paper. Results from quadruplicate filler rows of Banting corn, not reported in this table, show a 261 per cent increase in the first picking in favour of the paper plots.

The 222 per cent increase in onions under two inches in diameter with only a 2 per cent increase in onions over two inches, is due to the rate of thinning. All plots were thinned to a distance of 1 inch between plants. At the end of the season, the average distance between the plants in the paper plots was only 3 inches as compared with 7½ inches in the earth plots. The onions in the paper plots were so crowded as to prevent their normal growth, and hence, a large part of the crop was below 2 inches in diameter. If these onions had been thinned to 2 inches in the spring, an excellent crop would probably have resulted.

The summer of 1929 was unusually dry, and hence, the use of mulch paper, which tends to conserve soil moisture, may have resulted in a greater amount of benefit than would be the case in a normal year. It is probable, though, that under New Brunswick conditions the conservation of moisture is not so important as the increase in soil temperature, especially during the cold spring weather. The higher soil temperature at this period stimulates plant growth, thus getting the crop away to a good start, which is essential to profitable production later on.

No cost of production records were kept in this experiment, and hence, no data are available as to whether the use of mulch paper is an economical practice or not. The initial cost of the paper is very high as is also the cost of laying the paper at the time of planting. This is counterbalanced to a certain extent by the saving in cultivation during the summer months. However, it is quite evident that the use of mulch paper will only be profitable with crops of high acre value that respond to its use with a considerable increase in yield, and preferably, increased earliness as well.

ORNAMENTAL GARDENING

The culture of flowers and ornamental shrubs and trees is receiving increasing attention at this Station with the passing years, and much valuable information is gradually accumulating regarding the varieties best suited to our conditions. Among the things receiving most attention are annual and perennial flowers, shrubs for hedge, lawn and foundation plantings and roses. A fairly representative collection of roses is maintained, and special experimental work is now under way, comparing different methods of wintering roses, with the object of finding the method best suited to New Brunswick conditions.

CEREALS

The precipitation in May was 5·03 inches as compared with a sixteen-year average of 2·54 inches for that month. This heavy precipitation delayed farm operations so that seeding did not become general until the last week in May. Practically all cereal crops germinated well. Those sown on fertile heavy land came on rapidly and were apparently little affected by the scanty rainfall in June, July, August and September. Cereal crops sown on light lands in only a moderate state of fertility were thin, owing to poor tillering and the straw was short. The oat and barley kernels were well filled and of excellent quality. The wheat kernels, however, were badly shrunken owing to stem rust.

The work in this Division includes variety tests of wheat, oats, barley, beans, peas and buckwheat; tests of various mixtures of wheat, oats and barley; and of oats and barley; and tests of selections of wheat, barley, oats and buckwheat.

Variety tests and breeding plots of cereals. Note men standing between two plots of Elite seed stock of Victory oats five feet high.

VARIETY TESTS—WHEAT, OATS AND BARLEY IN FIELD PLOTS

The field on which the field plots of wheat, oats and barley were located was a medium loam. It has a rather low natural fertility and is adversely affected by dry weather.

A six-year rotation of hoed crop, grain, hay, hay, hay and grain is followed. In 1928, the field was given an application of 15 tons manure and 400 pounds of 2-12-5 fertilizer per acre for the turnip crops grown that year. No fertilizer was applied for the 1929 grain crop. The dry weather, coupled with the rather small fertilizer residue, tended to lower yields.

SPRING WHEAT

Five varieties of wheat were sown in quadruplicate plots of 1/100 acre each on May 28. The average rate of seeding was 1¾ bushels per acre. All the varieties germinated evenly. The stands were thin, however, as there was practically no tillering. The straw was short and very uneven in height. The yields were low and the kernels were badly shrunken owing to stem rust. The stem rust this year was the worst in the history of the Station. Of the varieties tested, Huron and White Russian appear to be the best adapted to this district. They are late maturing. Garnet is the most promising of the early wheats tested and is worthy of a trial when an early maturing variety is desired. White Russian, Garnet Ottawa 652 and Huron Ottawa 3 yielded in the order given.

OATS

Six varieties of oats were sown in quadruplicate plots of 1/100 acre each on May 28. The rate of seeding was 3 bushels for the hulled varieties and 9 pecks for Laurel—a hulless variety. All varieties germinated evenly. The oats were adversely affected by the dry weather during the growing season. The stand was thin owing to poor tillering and the straw was short. The crop was comparatively free from disease and the quality of the grain excellent. The early varieties suffered more from drought than the late varieties. Victory, Banner and Gold Rain appear to be the best adapted for the district of the varieties tested at this Station. The results are given in table 23.

TABLE 23.—OATS—VARIETY TESTS

Name of Variety	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Yield of grain per acre	Average yield of grain for 5 years	Weight per measured bushel after cleaning	Per cent hull	Yield of kernel per acre	*Average per cent for 4 years
		inches		bush. lb.	bush. lb.	lb.	%	lb.	%
Gold Rain	93·8	30·0	10·0	45 32	53 2	41·0	26·22	1,152	28·34
Victory	106·0	31·0	8·8	40 24	50 15	39·0	30·14	967	31·11
Banner, Ottawa 49	103·0	30·8	9·8	36 32	49 9	40·5	29·39	887	31·76
Legacy, Ottawa 678	91·0	25·5	10·0	25 33	.....	39·0	27·94	636	.....
Alaska	91·0	26·5	10·0	19 29	35 32	41·0	21·92	527	23·63
Laurel, Ottawa 477†	101·0	25·5	10·0	17 25	30 21	54·0	.....	.....	.....

* 1928 not included. † Hulless.

BARLEY

Eight varieties of barley were sown in 1/100 acre plots on May 28. Plumage Archer, and Hannchen were sown in single plots. The other varieties were sown in quadruplicate plots. Bearer, Star and O.A.C. No. 21 were sown at the rate of 2 bushels per acre, the other varieties were sown at the rate of 10 pecks per acre. In common with the oats and wheat sown in the same field, there was good germination, light tillering and exceptionally light straw. The quality of the grain was excellent. Star has given the highest

average yield for the two years that it has been tested. The straw, however, is rather short especially when grown on light land. O.A.C. No. 21 and Charlottetown No. 80 have given the best results of the varieties tested in field plots for five years. O.A.C. No. 21 is earlier maturing and has greater strength of straw than Charlottetown No. 80. This is an advantage when barley is being used for a nurse crop on land seeded down to hay. The results for this year are given in table 24:

TABLE 24—BARLEY—VARIETY TEST

Name of variety	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Yield of grain per acre		Weight per measured bushel after cleaning	*Average yield for 5 years	
		in.		bush.	lb.	lb.	bush.	lb.
Star	92·8	21·5	9·8	31	12	51·5	..	..
O.A.C. No. 21	94·5	28·5	9·0	25	45	52·5	28	18
Bearer, Ottawa 475	98·0	25·3	9·0	23	40	49·0	..	..
Charlottetown No. 80	105·5	24·0	8·0	21	23	53·5	30	23
Chinese, Ottawa 60	94·5	25·0	9·3	17	12	48·5	21	..
Gold	104·0	21·5	8·0	17	9	55·0	..	..
Plumage Archer C.D. 991	107·0	16·0	9·0	15	21	53·0	..	..
Hannchen	101·0	20·0	7·0	12	15	56·0	..	..

*1928 not included.

GRAIN MIXTURES

The grain mixtures shown in tables 25 and 26 were sown May 29 in duplicate 1/100 acre plots. The grains used in the mixtures were Huron wheat, Victory oats, and Charlottetown No. 80 barley. They were sown in the same field and on land given the same treatment as the variety test of wheat, oats and barley. The yields for 1925-1929 inclusive are given in tables 25 and 26:

TABLE 25—BARLEY, WHEAT AND OATS—SOWN IN COMBINATION

Mixture per acre, bushels	Number of days maturing 1929	Yield of grain per acre 1929	Yield of grain per acre 1928	Yield of grain per acre 1927	Yield of grain per acre 1926	Yield of grain per acre 1925	Average yield for last 5 years 1925–29
		lb.	lb.	lb.	lb.	lb.	lb.
Wheat 1, oats 1, barley 1	103·0	1,575	1,100	1,112	1,563	2,250	1,520
Wheat ½, oats 1, barley 1	103·0	1,435	1,050	975	1,825	2,550	1,567
Wheat ½, oats 2, barley 1	103·0	1,400	1,250	850	2,088	2,383	1,594
Huron wheat 1¾	100·3	523	505	128	800	1,400	671
Victory oats 3	106·0	1,384	1,200	1,238	1,516	2,637	1,595
Charlottetown No. 80 barley 2½	105·5	1,031	581	946	1,488	2,250	1,259

TABLE 26—BARLEY AND OATS—SOWN IN COMBINATION

Mixture per acre, bushels	Number of days maturing 1929	Yield of grain per acre 1929	Yield of grain per acre 1928	Yield of grain per acre 1927	Yield of grain per acre 1926	Yield of grain per acre 1925	Average yield for last 5 years 1925–29
		lb.	lb.	lb.	lb.	lb.	lb.
Oats 1, barley 1	103·0	1,153	925	1,013	1,694	2,250	1,407
Oats 1½, barley 1½	103·0	1,408	925	1,075	2,069	2,266	1,549
Oats 2, barley 1	103·0	1,575	950	1,388	2,301	2,416	1,726
Victory oats 3	106·0	1,384	1,200	1,238	1,516	2,637	1,595
Charlottetown No. 80 barley 2½	105·5	1,031	581	946	1,488	2,250	1,250

PEAS—VARIETY TEST IN ROD-ROW PLOTS

Six varieties of field peas were sown on May 24 in quadruplicated rod-row plots of five rows each. Each five rows of peas were separated by five rows of Garnet wheat. All five rows of peas were harvested. The land on which the peas were sown was a fertile medium loam. The dry weather favoured the peas. All varieties matured evenly and there was no loss from shelling. The results are given in table 27.

TABLE 27—PEAS—VARIETY TEST IN ROD-ROW PLOTS

Name of variety	Number of days maturing	Average length of straw	Average length of pod	Yield of grain 1929	Average yield for 5 years
		in.	in.	%	%
Chancellor, Ottawa 26	99·3	53·0	2·0	100·0*	100·0**
Canadian Beauty	111·5	71·5	2·5	94·6	114·4
Arthur, Ottawa 18	106·0	50·3	2·0	94·3	98·2
Prussian Blue	110·0	63·8	2·1	87·8	104·9
Mackay, Ottawa 25	112·0	80·0	2·3	87·1	91·3
Lemaire R 76–26	88·0	21·3	2·5	80·8	

*100—54·2 bushel per acre. **100–43·7 bushel per acre.

BEANS

The land on which the beans were grown grew a crop of buckwheat the previous year. This spring 15 tons of manure were ploughed under. The land was then disked and 1,200 pounds 2-12-15 fertilizer were applied broadcast and mixed with soil by means of the smoothing harrow. The land was then ribbed up into 30 inch drills.

Five varieties of beans were sown in quadruplicate plots on May 31. This year for the first time in eight years, all varieties were comparatively free from anthracnose. Marrowfat was the best quality. This variety takes longer to mature than the other varieties and for that reason it is usually difficult to harvest. This year, however, conditions were favourable and no difficulty was experienced in harvesting them. Soldier, while not the highest yielder, is early maturing and of good quality and has been fairly free from anthracnose. Navy, the highest yielder, is not as good quality as the other varieties and is usually badly affected with anthracnose. No. 118 has only been grown this year, but it is promising. The results are given in table 28:—

TABLE 28—BEANS—VARIETY TESTS

Name of variety	Date of ripening	Number of days maturing	Average length of straw	Average length of pod	Yield per acre	Weight per measured bushel after cleaning	Average yield for 8 years 1922–29
			in.	in.	bush. lb.	lb.	bush. lb.
Navy, Ottawa 711	Sept. 16—20	110·0	17·3	3·9	37 3	64·0	32 16
No. 118	Sept. 21—23	114·0	28·3	4·4	34 8	65·5	.. ..
White Marrowfat	Sept. 29	121·0	16·0	3·4	31 41	61·5	28 37
Soldier	Sept. 20—23	112·8	14·8	5·2	29 17	64·0	24 34
Yellow Eye, Kentville	Sept. 22—23	114·3	15·0	4·0	29 8	64·0	23 42

ROD-ROW VARIETY TEST OF CEREALS

Variety tests of wheat, barley and oats in rod-row plots have been carried on the last six years. The first three years all varieties under test were tested in quadruplicate each year. The last three years a number of varieties of wheat and barley which did not appear to have any economic importance were allowed one plot only each year. Varieties on which special information was wanted in the shortest possible time were each allowed eight plots. Tables 29 and 30 and 31 give the relative results for the varieties of wheat, oats and barley grown

this year for all the years they have been grown. The wheats are compared with Huron, Ottawa 3: the oats with Banner, Ottawa 49 and the barleys with O.A.C. No. 21.

TABLE 29—WHEAT—VARIETY TEST IN ROD-ROW PLOTS

Name of variety	Number years tested	Number of days maturing	Comparative length of straw including head	Comparative strength of straw on scale of 10 points	Comparative yield for years grown
			in.	in.	%
Huron, Cap Rouge	6	105·0	39·5	9·4	105·8
Whitehead's (Charlottetown No. 123)	5	105·7	39·9	8·8	104·6
Bishop, Ottawa 8	6	100·2	38·1	8·3	102·7
Huron, Ottawa 3	6	104·8	39·2	9·4	100·0*
White Russian (Ottawa Selected)	6	108·6	40·4	8·7	95·3
929 B	5	97·6	35·4	7·9	95·3
Major, Ottawa 522	6	99·3	37·8	8·6	94·4
Aurore	5	99·9	38·0	8·3	94·2
Early Russian, Ottawa 40	6	101·2	37·2	7·7	91·3
Garnet, Ottawa 652	6	95·3	35·5	8·7	90·8
Crown	5	96·9	33·2	8·9	87·5
Early Red Fife, Ottawa 16	6	103·9	38·3	9·2	86·0
Reward, Ottawa 928	6	96·8	35·4	8·5	84·1
Chelsea, Ottawa 10	5	98·1	36·9	8·4	83·7
Master, Ottawa 520	6	94·0	33·9	8·0	83·5
Red Fife, Ottawa 17	6	106·6	38·1	8·9	82·0
Marquis, Ottawa 15	6	101·2	35·6	9·1	76·8
Ruby, Ottawa 623	6	96·0	34·0	8·5	76·3
White Fife, Ottawa 11	6	108·3	39·4	9·0	73·9

TABLE 30—OATS—VARIETY TEST IN ROD-ROW PLOTS

Victory x Alaska	2	101·0	42·4	7·7	120–1
Banner Waugh	6	101·1	43·1	8·9	113·5
Leader B, Ottawa Selected	6	99·4	40·4	6·6	111·8
Banner Sask. 99	6	101·5	42·5	8·9	109·9
Banner McColne	6	101·3	42·3	9·0	108·8
Banner Dow	6	101·1	42·5	9·0	108·8
Danish Island (Swedish)	6	102·7	42·2	7·7	108·8
Banner Sask. 144	6	100·7	43·0	9·0	108·7
Victory (Swedish)	6	103·1	41·9	7·9	108·4
Banner McDonald 4407	6	101·1	42·1	9·1	107·9
Banner Langille	6	99·3	42·4	7·7	107·6
Lincoln	6	101·7	43·0	7·8	107·4
Banner Cap Rouge	6	101·0	42·9	8·4	106·8
Gold Rain (Swedish)	6	99·4	43·7	8·6	106·5
Banner U.B.C.	6	101·0	43·1	8·3	105·3
Star	2	100·0	38·7	8·6	105·1
Irish Victor P, Ottawa Selected	6	99·5	41·5	8·6	104·2
Gopher	1	89·0	34·7	8·7	103·0
O. A. C. No. 72	6	102·6	44·1	7·5	102·9
Banner Dixon	6	102·5	46·6	8·3	100·1
Banner, Ottawa 49	6	101·0	42·1	8·6	100·0†
Alaska	6	89·3	38·0	8·6	99·9
Columbian, Ottawa 78	6	101·8	41·3	7·3	99·9
Mansholts 3	6	101·3	39·7	8·7	99·6
Banner Griffin	6	99·5	42·8	7·2	98·6
Legacy, Ottawa 678	6	96·7	37·7	7·8	96·1
Longfellow, Ottawa 478	5	97·3	41·7	8·0	94·9
White Cross	4	89·5	40·9	6·1	91·0
Prolific, Ottawa 77	6	102·9	41·7	7·8	92·1
O. A. C. No. 144	3	103·0	46·0	5·9	92·0
Leader A, Ottawa Selected	6	94·4	39·5	7·3	85·7
O. A. C. No. 3	6	93·3	36·7	7·1	81·3
Richland C I 787	4	90·6	32·9	6·7	77·8
Cole	4	91·8	36·1	6·2	76·3
Laurel, Ottawa 477	6	99·2	37·4	9·3	63·6
Liberty, Ottawa 480	6	95·5	39·6	8·1	63·0

*100 equals 25·8 bushel per acre.

†100 equals 64·2 bushels per acre.

TABLE 31—BARLEY—VARIETY TEST IN ROD-ROW PLOTS

Name of variety	Number of years tested	Number of days maturing	Comparative length of straw including head	Comparative strength of straw on scale of 10 points	Comparative yield for years grown
			in.		%
Trebi	2	89·6	25·3	9·2	122·0
Manchurian Ottawa 50	6	90·9	34·3	8·6	100·7
O.A.C. No. 21	6	90·5	34·6	8·3	100·0*
Chinese Ottawa 60	6	90·2	35·2	8·6	99·3
Manchrian Cap Rouge	6	91·0	34·7	8·7	99·2
Velvet	3	92·2	34·8	8·6	99·2
Early Chevalier Ottawa 51	6	86·9	36·8	8·2	99·1
Mensury McDonald 809	6	90·7	34·5	8·8	98·3
Star	5	88·8	28·6	8·9	97·2
Mandscheuri McDonald 1807	6	90·6	34·9	8·4	96·6
Mandscheuri McDonald 809	6	91·0	35·4	8·4	95·9
Bearer Ottawa 475	6	94·2	33·9	8·4	93·4
Charlottetown No. 80	6	95·8	32·2	8·6	92·6
Hannchen Sask. 229	6	92·5	31·3	7·0	88·8
Glabron	3	93·0	34·2	8·9	86·8
Gold (Swedish)	6	94·0	28·8	8·4	84·5
Feeder Ottawa 560	6	86·8	36·0	7·6	82·9
French Chevalier	6	95·3	38·3	9·2	76·5
Duckbill McDonald 207	6	96·3	32·9	8·9	72·8
Duckbill Ottawa 57	6	97·1	32·6	9·1	68·4
Plumage Archer C. D. 991	1	104·0	28·5	7·5	66·7
Himalayan Ottawa 59	6	84·3	27·6	7·2	64·2
Guymayle McDonald	6	86·5	27·1	7·1	63·5

*100 equal 47·3 bushels per acre.

FORAGE CROPS

The late spring delayed farm operations and made the planting later than usual. The stands were good in nearly every instance but the dry weather during the summer months checked growth so that yields were smaller than usual.

Unless otherwise stated, yields were taken for only those portions of each plot which had a perfect stand. When possible, composite samples were taken at harvest from each plot of swedes, turnips, kale, rape, mangels, sugar beets, corn, soy beans, alfalfa and clover. These samples were air dried and sent to Ottawa for dry matter determination.

SWEDES AND TURNIPS—VARIETY TESTS

The field on which the variety tests of swedes and turnips were conducted was a clay loam. In the fall a one-year old clover sod was given an application of 15 tons manure and ploughed under. In the spring the land was loosened up with the stiff tooth cultivator. It was then given a broadcast application of 800 pounds 2-12-5 fertilizer per acre. This fertilizer was mixed with the soil by means of the smoothing harrow. The field was then ridged up into 30 inch drills. Each variety of swedes and turnips was tested four times in drills 100 feet long.

SWEDES.—Thirty-four varieties of swedes were sown on June 10. They were thinned to an average of 10·6 inches apart on June 28 and 29. Two plots of each variety were pulled on October 26, one plot of each variety was pulled on October 29 and the remaining plot was pulled on October 30. The yields were below average and very rooty. This was due to the dry weather which prevailed during the growing season. Yields are given in table 32. (Project Ag. 51.)

FALL TURNIPS.—Eight varieties of turnips were sown on June 11. They were thinned to an average of 10·2 inches apart on July 1. They were all pulled on September 27. Yields are given in table 32. (Project Ag. 46.)

TABLE 32—SWEDES AND FALL TURNIPS—VARIETY TEST

Name of variety	Source of seed	Yield per acre			
		Green weight		Dry weight	
		tons	lb.	tons	lb.
SWEDES					
Best of All	Wm. Ewing Co	25	1,436	2	1,692
Bangholm, Lyngly and Studsgaard	Danske Landboforeningers Froforsyning.	24	1,389	2	1,684
Kangaroo	Wm. Ewing Co	25	65	2	1,550
Best of All	Wm. Rennie Seed Co	26	763	2	1,542
Hall's Westbury	Wm. Rennie Seed Co	25	846	2	1,485
Improved Yellow Swedish	General Swedish Seed Co., Svalof	22	725	2	1,453
Canadian Gem	Wm. Rennie Seed Co	26	370	2	1.441
Invicta Bronze Top	Wm. Rennie Seed Co	26	1,101	2	1,420
Bangholm	Wm. Ewing Co	24	323	2	1,413
Bangholm, Klank	Hjalmar, Hartman & Co., Copenhagen	23	1,100	2	1,385
Mammoth Clyde Purple Top	Wm. Ewing Co	23	1,298	2	1,378
Hall's Westbury	Wm. Fwing Co	26	33	2	1,339
Bangholm	General Swedish Seed Co., Svalof	23	546	2	1,330
Olsgaard Bangholm	Hjalmar, Hartman & Co., Copenhagen	25	95	2	1,293
Derby Bronze Green Top	Wm. Rennie Seed Co	26	280	2	1,243
Bangholm	Kentville Experimental Station	21	1,316	2	1,227
Magnum Bonum	Wm. Rennie Seed Co	24	734	2	1,146
Mustiala	Hjalmar, Hartman & Co., Copenhagen	24	289	2	1,140
Ditmar	H. H. McNutt	25	834	2	1,137
Irish King	Wm. Rennie Seed Co	25	723	2	1,021
Derby Green Top	J. A. Bruce, Hamilton	23	1	2	936
Improved Bronze Top	Drummond	25	1,523	2	921
New Century	Wm. Rennie Seed Co	23	105	2	895
Bangholm	Nappan Experimental Station	20	73	2	889
Magnum Bonum	Wm. Ewing Co	22	1,318	2	801
Corning Green Top	Yarmouth Fruit Producers	22	1,030	2	713
Hazard's Improved B. T	Steele Briggs	22	916	2	680
Hartley's Bronze Top	Wm. Rennie Seed Co	21	1,805	2	652
Kangaroo Bronze Green Top	Wm. Rennie Seed Co	21	54	2	553
Garton's Superlative	Wm. Ewing Co	23	550	2	467
White Butter	Hjalmar, Hartman & Co., Copenhagen	17	626	2	378
Shephard Golden Globe	Hjalmar, Hartman & Co., Copenhagen	20	1,193	2	365
Universal	Wm. Ewing Co	20	1,012	2	351
Hazard's Improved	Wm. Rennie Seed Co	20	410	2	311
TURNIPS					
Bortfelder	Hjalmar, Hartman & Co., Copenhagen	23	1,130	1	1,884
Early Six Weeks	Suttons & Sons, England	23	965	1	1,865
Fynsk Bortfelder	Danske Landboforeningers Froforsyning.	24	1,066	1	1,642
Dales Roskilde	Danske Landboforeningers Froforsyning.	21	594	1	1,556
Fynsk Bortfelder	Hjalmar, Hartman & Co., Copenhagen	22	1,869	1	1,555
Greystone	Steele Briggs	21	1,492	1	1,517
Red Paragon	Suttons & Sons, England	22	506	1	1,359
Yellow Tankard	Danske Landboforeningers Froforsyning.	19	1,845	1	1,120

MANGELS AND SUGAR BEETS—VARIETY TEST

The field on which these plots were located grew a crop of grain the previous year. This spring 15 tons manure per acre were ploughed under. The land was then harrowed with the disk and spring tooth harrows. Twelve hundred pounds 2-12-5 fertilizer were then applied broadcast and mixed with the soil by means of the smoothing harrow. The field was then rolled to break up the lumps and ridged up into 30 inch drills. Owing to the late spring and the wet weather, the field could not be worked until the last week in May. This made the seeding rather late. The germination was good but the roots were smaller than usual.

MANGELS.—Twenty-nine varieties of mangels were sown in four plots each on May 29. They were thinned to 10·5 inches between plants on June 27. Plots 1 and 2 of each variety were pulled on October 8 and plots 3 and 4 of each variety on October 10. The yields are given in table 33. (Project Ag. 16.)

SUGAR BEETS—Three varieties of sugar beets were sown on May 29. They were thinned to 10·6 inches between plants on June 26 and were pulled on October 2. The results are given in table 33. (Project Ag. 66.)

TABLE 33.—MANGELS AND SUGAR BEETS—VARIETY TEST

Name of variety	Source of seed	Yield per acre			
		Green weight		Dry weight	
		tons	lb.	tons	lb.
MANGELS					
Giant White Half Sugar	Wm. Ewing Co	22	1,029	3	384
Taaroje Barres	Hjalmar, Hartman & Co., Copenhagen	25	472	3	212
Danish Sludstrup	Wm. Ewing Co	25	110	2	1,921
Ideal	Wm. Rennie Seed Co	20	1,165	2	1,710
Leviathan	Wm. Rennie Seed Co	21	1,849	2	1,689
Eckendorfer Yellow	Hjalmar, Hartman & Co., Copenhagen	24	363	2	1,674
Elevetham Mammoth	Hjalmar, Hartman & Co., Copenhagen	18	196	2	1,587
Rubra	General Swedish Seed Co., Svalof	18	578	2	1,532
Stryno Barres	Hjalmar, Hartman & Co., Copenhagen	23	900	2	1,519
Improved Giant	Wm. Rennie Seed Co	18	1,438	2	1,510
Barres Half Long	Generu Swedish Seed Co., Svalof	20	619	2	1,446
Yellow Intermediate	Central Experimental Farm	18	1,745	2	1,446
Danish Sludstrup	Kenneth McDonald & Sons	22	249	2	1,433
Sludstrup Barres	Hjalmar, Hartman & Co., Copenhagen	20	606	2	1,421
White Red Top Half Sugar	Hjalmar, Hartman & Co., Copenhagen	19	171	2	1,358
Barres Oval	Hjalmar, Hartman & Co., Copenhagen	21	201	2	1,332
Golden Tankard	Wm. Ewing Co	22	334	2	1,320
Perfection Mammoth Long Red	Wm. Rennie Seed Co.	18	1,668	2	1,279
Barres Sludstrup	General Swedish Seed Co., Svalof	19	1,664	2	1,272
WhiteGreen Top Half Sugar	Hjalmar, Hartman & Co., Copenhagen	19	1,156	2	1,164
Eckendorfer Red	Hlajmar, Hartman & Co., Copenhagen	23	1,285	2	1,159
Ferritslev Barres	Hjalmar, Hartman & Co., Copenhagen	22	1,118	2	1,141
Giant Yellow Intermediate	Wm. Ewing Co	22	118	2	1,107
Giant Yellow Globe	Wm. Rennie Seed Co	22	1,165	2	1,092
Long Red Mammoth	Wm. Ewing Co	18	1,921	2	1,068
Yellow Eckendorfer	General Swedish Seed Co., Svalof	21	1,518	2	1,049
Red Eckendorfer	General Swedish Seed Co., Svalof	20	114	2	726
Giant Yellow Globe	Wm. Ewing Co	21	1,849	2	719
Golden Tankard	Wm. Rennis Seed Co	15	1,832	1	1,920
SUGAR BEETS					
Fredericksen		13	1,463	3	195
Horning		13	1,272	3	180
Ralbethege & Giesecke		8	1,841	2	98

KALE AND RAPE—VARIETY TEST

This test was conducted on the same field and on land given the same treatment as that used in the "Swede and Turnip—Variety Test." Each variety was tested in quadruplicate and each plot consisted of a row 100 feet long and 30 inches wide.

Five varieties of kale and one variety of rape were sown on June 11. They were thinned to 8 inches apart in the rows on July 2. The crop made such slow growth during the dry weather that it was not cut in September as the previous years, but was left until October 11 in the hope that the crop would grow when the rain commenced. The yields would probably have been larger, however, if they had been cut at the usual time. Besides making very little growth after the middle of September, the lower leaves of both the kale and rape fell off. The yields are given in table 34. (Project Ag. 64.)

TABLE 34.—KALE AND RAPE—VARIETY TEST

Name of variety	Source of seed	Yield per acre			
		Green weight		Dry weight	
KALE		tons	lb.	tons	lb.
1,000 headed Kale	Sutton & Sons, England	11	572	1	1,695
Green Stemmed Marrow Kale	Sutton & Sons, England	12	332	1	1,619
Purple Stemmed Marrow Kale	Sutton & Sons, England	11	1,672	1	1,597
Improved 1,000-headed kale	Sutton & Sons, England	10	1,164	1	1,496
Sheep Kale	Sutton & Sons, England	6	1,772	1	315
RAPE					
Giant rape	Sutton & Sons, England	10	152	1	1,559

CORN—VARIETY TEST

A one year old sod—mostly alsike clover with scattered alfalfa plants—was given a broadcast application of 15 tons manure this spring and ploughed. The field was then disked and 1,200 pounds of 2-12-5 fertilizer were applied per acre. This fertilizer was mixed with the soil by means of the smoothing harrow. As the field was inclined to be lumpy, it was harrowed once with the chain harrow and then rolled to break the lumps.

The corn was planted in hills 3 feet apart each way and later thinned to four plants to each hill. Four plots were sown with each variety. The area of each plot was 270 square feet when the outside hills were removed.

The corn was sown on June 1. The corn made very slow growth during June but made fair growth the latter part of July and during August. The corn was harvested on September 23. The yields are given in table 35. (Project Ag. 1.)

TABLE 35.—CORN—VARIETY TEST

Name of variety	Source of seed	Degree of maturity	Yield per acre			
			Green weight		Dry weight	
			tons	lb.	tons	lb.
Burr Leaming	G. S. Carter	Kernels forming to very early milk.	19	1,120	3	481
Hybrid	A. J. Wimple	Early to medium milk	19	1,902	3	89
Hybrid	Twitchells' Pride Wisconsin No. 7.	Late milk to early dough	17	131	2	1,963
North Dakota White Flint.	Steele Briggs	Very early milk	18	988	2	1,753
White Capped Yellow Dent.	Steele Briggs	Kernels forming to beginning to come in milk.	16	1,583	2	1,509
Northwestern Dent	Dakota Improved Seed Co.	Early milk to early dough	13	1,340	2	1,277
Wisconsin No. 7	J. O. Duke Seed Co	Kernels formed	16	869	2	1,276
Canada Leaming	G. S. Carter	Kernels forming to early milk.	16	1,809	2	1,237
Amber Flint	A. J. Wimple	Kernels forming to early milk.	16	1,678	2	1,221
Leaming No. 9	J. O. Duke Seed Co	Early milk	14	1,436	2	1,049
Pride Yellow Dent	Dakota Improved Seed Co.	Kernels forming to early milk.	15	1,254	2	937
Northwestern Dent	McDonald College	Medium milk	14	1,198	2	897
Longfellow	J. O. Duke Seed Co	Early to late milk	14	1,529	2	862
Northwestern Dent	A. E. McKenzie, Crookston strain.	Very early dough	12	812	2	708
Golden Glow	J. O. Duke Seed Co	Early milk	13	1,175	2	693
90 Day White Dent	Dakota Improved Seed Co.	Kernels forming to early milk.	15	1,168	2	570
Northwestern Dent	A. E. McKenzie, North Dakota grown.	Early dough	11	296	2	365
Quebec No. 28	MacDonald College	Medium dough	9	1,694	1	1,733
Twitchell's Pride	Fredericton Experimental Station.	Early dough to glazing	9	1,220	1	1,608
Northwestern Dent	Experimental Farm, Brandon.	Late milk—denting	7	1,189	1	1,247
Yellow Dent	A. J. Wimple	Late milk to medium dough	8	497	1	661

SOY BEANS—VARIETY TEST

Four varieties of soy beans were tested in quadruplicate this year. Three plots of each variety were cut for hay and one plot of each variety was allowed to ripen seed. The seed in all cases ripened satisfactorily. Yellow 210 gave a yield of 15 bushels 15 pounds per acre. Work with soy beans will be continued, as there is a possibility that this crop will prove of value in this district.

ALFALFA—VARIETY TEST

An experiment was begun in 1928 to test the hardiness, yield and general suitability of a number of varieties of alfalfa under New Brunswick conditions.

The land on which the experiment was conducted was a sandy loam with a sandy subsoil. It was broken in 1922. In 1923 buckwheat was sown on the field and ploughed under. In 1924 a three-year rotation of hoed crop, grain and hay was started on this field. For the hoed crop in 1924, the field was given an application of 15 tons manure and 800 pounds 4-8-6 per acre. For the hoed crop in 1927, the field was given an application of 1,000 pounds 4-8-6 fertilizer per acre. In the spring of 1928, a composite sample of the soil was sent to the Chemistry Division of the Central Experimental Farm, Ottawa. The pH value was 5·29 making the lime requirement 6,360 pounds carbonate of lime per acre. Therefore, the field was given an application of ground limestone at the rate of 4 tons per acre. No commercial fertilizer was applied in either 1928 or 1929.

The land was prepared for the alfalfa experiment by ploughing in the fall of 1927. In the spring of 1928 it was put in good tilth by means of the stiff tooth cultivator, disk and smoothing harrows.

On June 6, 1928 seed of six varieties of alfalfa was sown at the rate of 20 pounds per acre in quadruplicate plots. These plots were each 1/132 of an acre when one foot borders were removed. Garnet wheat sown at the rate of one bushel per acre was used as a nurse crop. Excellent stands were secured on all plots. The field was bare, however, the greater part of the winter and all the varieties, except Medicago Falcata, badly winter-killed. Grimmy alfalfa proved next hardiest. The alfalfa was cut on July 22 when one-tenth in bloom. The alfalfa was short on all plots and lacked vigour. This was in all probability due to lack of fertility in the soil. The yields are given in table 36. (Project Ag. 126.)

TABLE 36.—ALFALFA—VARIETY TEST

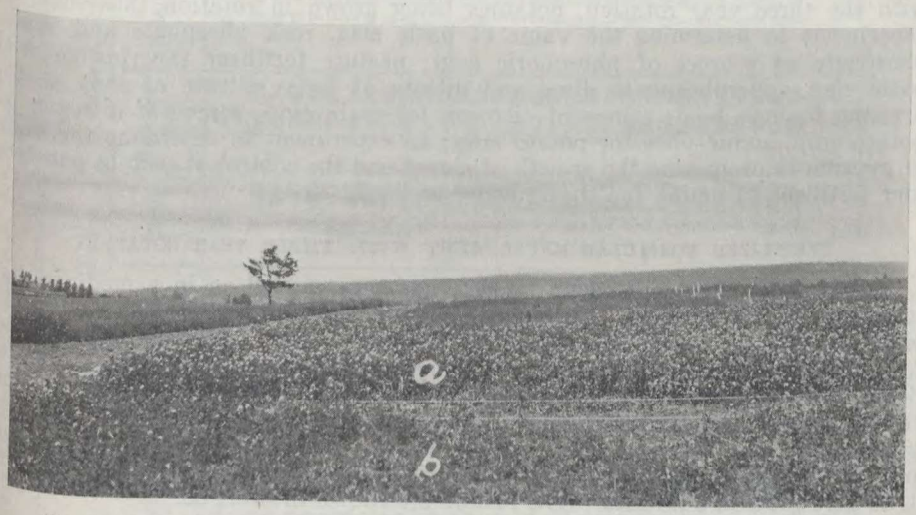
Name of variety	Estimated percentage of winter killing	Green weight per acre		Hay per acre	
	%	tons	lb.	tons	lb.
Medicago Falcata	.....	4	514	1	527
Grimm	19	2	815	0	1,399
Baltic (Disco)	37	2	168	0	1,215
Cossack (Disco)	41	1	1,762	0	1,114
Ontario Variegated	59	1	574	0	754
Montana, Popp & Lang	64	0	1,888	0	556

RED CLOVER SEED GROWING VERSUS HAY FOR PROFIT

On June 6, 1928, twelve plots each 1/132 of an acre were sown with St. Clet red clover seed at the rate of 15 pounds per acre in order to determine (1) whether hay or a seed crop will give the greater profit (2) which cutting will give the highest seed yield.

The clover seed was sown broadcast and Garnet wheat at the rate of one bushel per acre was used as a nurse crop. The outline of the experiment is as follows:—

(1) Four plots—two cuttings for hay.
(2) Four plots—first cutting for hay, second for seed.
(3) Four plots—first crop for seed.



Demonstrating the value of ground limestone for clover production. (a) Ground limestone at three tons per acre. (b) Check.

The land used in this experiment was part of the same field as that used in the "Alfalfa—Variety Tests," and except that it was given an application of 3½ tons ground limestone per acre, instead of the 4 ton application given the alfalfa land, it was given identical treatment. The results are given in table 37.

TABLE 37.—RED CLOVER SEED GROWING VERSUS HAY FOR PROFIT

Item		Red clover 2 cuttings for hay	Red clover 1st cutting hay, 2nd cutting seed	Red clover 1st cutting seed
Hay per acre 1st cutting	lb.	1,870	1,969	.....
Hay per acre 2nd cutting	lb.	3,542	.....	.....
Total hay per acre	lb.	5,412	1,969	.....
Seed per acre 1st cutting	lb.	.....	.....	7·5
Seed per acre 2nd cutting	lb.	.....	26·5	.....
Total seed per acre	lb.	.....	26·5	7·5
Statement of Cash Value				
Hay at $12.16 per ton	$	32·90	11·97	.....
Seed at 22 cents per lb	$	.....	5·83	1·65
Total value of crop	$	32·90	17·80	1·65

EXPERIMENTS WITH FERTILIZERS

The work with the Chemistry Division during the year was partly a continuation of experiments begun in previous years and the balance was new projects which included an experiment to determine the value of nitrophoska as a fertilizer for the potato crop in a three year rotation, and an expansion of the work in pasture improvement. The permanent pasture, which was laid off in 1928 for a rotational grazing and fertilizer experiment was resurveyed and carried on under extended plans. A series of small plots was laid down as a companion experiment for the grazing plots. The old projects, which were continued during the year included the fertilizer formulae experiment with the three year rotation, potatoes being grown in rotation this year; an experiment to determine the value of basic slag, rock phosphate and superphosphate as sources of phosphoric acid; pasture fertilizer experiments with basic slag, superphosphate, lime and nitrate of soda; nitrate of soda as top dressing for hay land; source of nitrogen for grain crop; source of nitrogen for potato crop, ammo-phos for potato crop; an experiment to determine the value of gypsum in promoting the growth of clover and the control of scab in potatoes, and fertilizer formulae for the growing orchard.

FERTILIZER FORMULAE EXPERIMENT WITH THREE YEAR ROTATION

This experiment was begun in 1922 and was carried on in a medium clay loam with a clay sub-soil. No manure has been applied to this field since 1921, when ten tons per acre were applied for the potato crop. Ten different fertilizer formulae have been applied at three different rates per acre, the object being to determine which fertilizer formula and rate of application would give the best results under New Brunswick conditions in a three year rotation of potatoes, grain and hay. Potatoes were grown during the present year. These were planted on June 4 and dug on September 30. The yields were taken from one 1/88 acre plots in duplicate. The results are shown in table 38.

NOTES ON RESULTS:—On the whole, the best results have been obtained when 2,000 pounds of fertilizer have been applied per acre. This is particularly noticeable in the yields from the 5-8-6, 4-8-6, 3-8-6, 4-8-10 and 4-8-8 formulae.

The greatest increase over the checks was obtained from a 4-8-10 mixture applied at the rate of 2,000 pounds per acre and the cost of this increase was twenty-one cents per hundredweight of merchantable potatoes.

The most economical increase was obtained from applying a ton of the 3-8-6 mixture per acre. This was followed closely by a ton of 4-8-10 and a half-ton of 4-6-6. It is obvious from the results that four per cent potash in the mixture is not sufficient.

TABLE 38.—FERTILIZER FORMULAE EXPERIMENT, THREE YEAR ROTATION—POTATOES, OATS, HAY. RESULTS FROM POTATO CROP IN 1929

Plot	Fertilizer formula	Rate of application	Cost of fertilizer	Yield per acre			Increase over checks			Value of crop increase			Cost of increase merchantable potatoes per cwt. over check	Average cost of increase per cwt. at various rates
				Merchantable	Small	Total	Merchantable	Small	Total	Merchantable	Small	Total		
		lb.	$	lb.	lb.	lb.	lb.	lb.	lb.	$	$	$	cts.	cts.
1	6-6-6	2,000	33 13	12,408	1,056	13,464	6,743	314	7,057	101 14	0 62	101 76	48	
2	5-6-6	2,000	30 03	12,408	1,188	13,596	6,743	446	7,189	101 14	0 89	102 03	43	
3	4-6-6	2,000	26 90	12,760	1,144	13,904	7,095	402	7,497	106 42	0 80	107 22	37	
4	3-6-6	2,000	23 78	13,904	1,386	15,290	8,239	644	8,883	123 58	1 28	124 86	27	
5	5-8-6	2,000	32 47	15,664	1,320	16,984	9,999	578	10,577	149 98	1 15	151 13	31	
6	4-8-6	2,000	29 34	15,488	1,364	16,852	9,823	622	10,445	147 34	1 24	148 58	28	
7	3-8-6	2,000	26 22	18,876	1,188	20,064	13,211	446	13,657	198 16	0 89	199 05	19	
8	4-8-10	2,000	32 76	20,372	968	21,340	14,707	226	14,933	220 60	0 45	211 05	21	
9	4-8-8	2,000	31 04	18,040	1,408	19,448	12,375	666	13,041	185 62	1 33	186 95	24	
10	4-8-4	2,000	27 64	13,948	1,232	15,180	8,283	490	8,773	124 24	0 98	125 22	32	31
11	6-6-6	1,500	24 84	14,410	968	15,378	8,745	226	8,971	131 17	0 45	131 62	27	
12	5-6-6	1,500	22 52	13,726	1,276	15,004	8,063	534	8,597	120 94	1 06	122 00	26	
13	4-6-6	1,500	20 17	13,046	1,034	14,080	7,381	292	7,673	110 71	0 58	111 29	26	
14	3-6-6	1,500	17 83	12,056	1,320	13,376	6,391	578	6,969	95 86	1 15	97 01	26	
15	5-8-6	1,500	24 35	10,296	1,430	11,726	4,631	688	5,319	69 46	1 37	70 83	49	
16	4-8-6	1,500	22 00	11,132	1,276	12,408	5,467	534	6,001	82 00	1 06	83 06	38	
17	3-8-6	1,500	19 66	9 636	1,364	11,000	3,971	622	4,593	59 56	1 32	60 88	46	
18	4-8-10	1,500	24 57	14,784	1,100	15,884	9,119	358	9,477	136 78	0 71	137 49	26	
19	4-8-8	1,500	23·28	13,068	924	13,992	7,403	182	7,585	111 04	0 36	111 40	30	
20	4-8-4	1,500	20 73	10,824	1,474	12,298	5,159	732	5,891	77 38	1 46	78 84	37	33
21	4-6-6	1,000	16 56	9,636	1,232	10,868	3,971	490	4,461	59 56	0 98	60 54	39	
22	5-6-6	1,000	15 01	9,130	1,430	10,560	3,465	688	4,153	51 97	1 37	53 34	39	
23	4-6-6	1,000	13 45	11,836	990	12,826	6,171	248	6,419	92 56	0 49	93 05	21	
24	3-6-6	1,000	11 89	9 856	1,386	11,242	4,191	644	4,835	62 86	1 28	64 14	25	
25	5-8-6	1,000	16 23	11,088	1,122	12,210	5,423	380	5,803	81 34	0 76	82 10	28	
26	4-8-6	1,000	14 67	9,856	1,232	11,088	4,191	490	4,681	62 86	0 98	63 84	32	
27	3-8-6	1,000	13 11	9,592	1,188	10,780	3,927	446	4,373	58 90	0 89	59 79	31	
28	4-8-10	1,000	16 38	9,680	1,540	11,220	4,015	798	4,813	60 22	1 59	61 81	36	
29	4-8-8	1,000	15 52	10,164	1,100	11,264	4,490	358	4,857	67 48	0 71	68 19	32	
30	4-8-4	1,000	13 82	7,348	1,936	9,284	1,683	1,194	2,877	25 24	2 38	27 62	68	35
Checks (Average of checks)				5,665	742	6,407								

TABLE 39—FERTILIZER FORMULAE EXPERIMENT—THREE YEAR ROTATION—POTATOES, OATS AND HAY—

Results from Potato Crop 1922, 1926 and 1929, as well as average results to date

Plot	Fertilizer	Rate of application per acre	Cost of fertilizer				Increased yield per acre merchantable potatoes over checks				Cost of increased yield of merchantable potatoes per hundredweight			
			1922	1926	1929	Average	1922	1926	1929	Average	1922	1926	1929	Average
		lb.	$	$	$	$	lb.	lb.	lb.	lb.	cts.	cts.	cts.	cts.
1	6-6- 6	2,000	42 84	35 10	33 13	37 02	4,773	9,480	6,743	6,998	53·8	37·0	48	46·2
2	5-6- 6	2,000	38 36	31 32	30 03	33 23	7,524	6,210	6,743	6,825	30·6	50·4	43	41·0
3	4-6- 6	2,000	33 89	27 55	26 90	29 44	6,174	6,330	7,095	6,533	32·9	43·5	37	37·8
4	3-6- 6	2,000	29 41	23 77	23 78	25 65	5,105	8,250	8,239	7,198	34·6	28·8	27	30·1
5	5-8- 6	2,000	41 61	33 95	32 47	36 01	5,493	9,360	9,999	8,284	45·4	36·3	31	37·5
6	4-8- 6	2,000	37 14	30 18	29 34	32 22	7,023	9,420	9,823	8,755	31·7	32·0	28	30·5
7	3-8- 6	2,000	32 66	26 40	26 22	28 42	7,995	7,260	13,211	9,488	24·5	36·4	19	26·6
8	4-8-10	2,000	41 30	33 22	32 76	35 76	8,463	7,620	14,707	10,263	29·2	43·6	21	31·2
9	4-8- 8	2,000	39 22	31 70	31 04	33 98	7,872	7,170	12,375	9,139	29·8	44·2	24	32·6
10	4-8- 4	2,000	35 06	28 66	27 64	30 45	5,292	4,560	8,283	6,045	39·7	62·9	32	44·8
11	6-6- 6	1,500	31 99	26 33	24 39	27 57	5,832	6,390	8,745	6,989	32·9	41·2	27	33·7
12	5-6- 6	1,500	28 88	23 48	22 52	24 96	5,202	6,900	8,063	6,721	33·3	34·0	26	31·1
13	4-6- 6	1,500	25 38	20 66	20 17	22 07	6,081	5,190	7,381	6,217	25·0	39·8	26	30·2
14	3-6- 6	1,500	22 07	17 83	17 83	19 24	6,993	5,910	6,391	6,431	18·9	30·2	26	25·0
15	5-8- 6	1,500	31 35	25 46	24 35	27 05	6,873	6,900	4,631	6,134	27·3	36·9	49	37·7
16	4-8- 6	1,500	27 85	22 63	22 00	24 16	6,794	7,680	5,467	6,647	24·6	29·5	38	30·7
17	3-8- 6	1,500	24 54	19 79	19 66	21 33	5,913	6,420	3,971	5,434	24·9	30·8	46	33·9
18	4-8-10	1,500	30 97	24 91	24 57	26 81	6,282	6,540	9,119	7,313	29·5	38·1	26	31·2
19	4-8- 8	1,500	29 41	23 77	23 28	25 48	5,994	6,540	7,403	6,645	29·4	36·3	30	31·9
20	4-8- 4	1,500	26 29	21 49	20 73	22 83	5,394	6,060	5,159	5,537	29·2	35·5	37	33·9
21	6-6- 6	1,000	21 42	17 55	16 56	18 51	5,622	5,500	3,971	5,031	22·8	32·0	39	31·2
22	5-6- 6	1,000	19 18	15 66	15 01	16 61	5,352	6,720	3,465	5,179	21·5	23·3	39	27·9
23	4-6- 6	1,000	16 94	13 78	13 45	14 72	4,332	2,970	6,171	4,491	23·4	46·4	21	30·2
24	3-6- 6	1,000	14 70	11 89	11 89	12 82	4,524	3,570	4,191	4,095	19·5	33·3	25	25·9
25	5-8- 6	1,000	20 80	16 98	16 23	18 00	4,695	5,730	5,423	5,249	26·5	29·6	28	28·0
26	4-8- 6	1,000	18 57	15 09	14 67	16 11	4,464	4,230	4,191	4,295	24·9	35·7	32	30·8
27	3-8- 6	1,000	16 33	13 20	13 11	14 21	4,212	5,700	3,927	4,613	23·2	23·2	31	25·8
28	4-8-10	1,000	20 65	16 61	16 38	17 88	4,413	5,550	4,015	4,659	28·0	29·9	36	31·3
29	4-8- 8	1,000	19 61	15 84	15 52	16 99	3,453	6,630	4,499	4,860	34·0	23·9	32	29·9
30	4-8- 4	1,000	17 53	14 32	13 82	15 22	3,192	6,780	1,683	3,885	32·9	21·1	68	40·6

NOTES ON RESULTS:—The largest average increase in merchantable potatoes was obtained where one ton of 4-8-10 mixture was applied per acre. The second largest increase was from a ton of 3-8-6 mixture and the third from a ton of 4-8-8 mixture.

The cost of increased yield of merchantable potatoes was lowest where 1,500 pounds of 3-6-6 were applied per acre, followed closely by 1,000 pounds of 3-8-6, 1,000 pounds of 3-6-6, 2,000 pounds of 3-8-6 and 1,000 pounds of 5-6-6.

The average cost of the increased yield of merchantable potatoes from the various formulae applied at the three rates was as follows:—

	cts.
2,000 pounds per acre	35·8 per cent
1,500 "	31·9 "
1,000 "	30·1 "

SOURCES OF NITROGEN FOR THE POTATO CROP

This experiment was begun in 1926 to determine the relative value of different sources of nitrogen, such as cyanamide and urea, as compared with a mixture of nitrate of soda and sulphate of ammonia. This experiment carried on in a three-year rotation of potatoes, oats and hay was primarily designed to determine the value of the above nitrogenous fertilizers for the potato crop. The equivalent of a 4-8-6 fertilizer mixture was applied at the rates of 1,000 and 2,000 pounds per acre. Nitro chalk, which was available in this country last year for the first time, was included in the experiment this year. The experiments were carried on in medium clay loam in 1/320 acre plots, replicated four times. Potatoes were planted June 15 and dug on October 2. Fertilizer was applied in the row and covered with earth. Where cyanamide was used, it was applied five days previous to planting. The results are shown in table 40.

TABLE 40—SOURCES OF NITROGEN FOR THE POTATO CROP

Fertilizer used per acre	4-8-6 equivalent per acre	Per cent stand	Yield per acre		
			Merchantable	Small	Total
	lb.		lb.	lb.	lb.
Nitrate of soda, 133 pounds Sulphate of ammonia, 100 pounds Superphosphate, 500 pounds Muriate of potash, 120 pounds	1,000	94·27	13,960	2,960	16,920
Cyanamide, 190 pounds (sown a week before planting) Superphosphate, 500 pounds Muriate of potash, 120 pounds	1,000	93·75	12,800	2,800	15,600
Nitro chalk, 258 pounds Superphosphate, 500 pounds Muriate of potash, 120 pounds	1,000	93·22	13,920	3,040	16,960
Cyanamide, 100 pounds Basic slag, 500 pounds Muriate of potash, 120 pounds	1,000	95·83	11,560	2,560	14,120
Urea, 87 pounds Superphosphate, 500 pounds Muriate of potash, 120 pounds	1,000	96·35	13,680	2,800	16,480
Checks	.....	98·43	6,420	2,660	9,080
Nitrate of soda, 266 pounds Sulphate of ammonia, 200 pounds Superphosphate, 1,000 pounds Muriate of potash, 240 pounds	2,000	90·97	17,333	1,920	19,253

TABLE 40—SOURCES OF NITROGEN FOR THE POTATO CROP—*Concluded*

Fertilizer used per acre	4-8-6 equivalent per acre	Per cent stand	Yield per acre		
			Merchantable	Small	Total
	lb.		lb.	lb.	lb.
Cyanamide, 380 lbs. (sown a week before planting) Superphosphate, 1,000 pounds Muraite of potash, 240 pounds	2,000	93·75	12,920	2,640	15,560
Nitro chalk, 516 pounds Muriate of potash, 240 pounds Superphposphate, 1,000 pounds	2,000	96·35	14,240	3,000	17,240
Cyanamide, 380 pounds Basic slag, 1,000 pounds Muriate of potash, 240 pounds	2,000	91·66	11,200	2,120	13,320
Urea, 174 pounds Superphosphate, 1,000 pounds Muriate of potash, 240 pounds	2,000	93·75	16,960	2,613	19,573
Checks	.....	93·43	6,420	2,660	9,080

NOTES ON RESULTS.—Where 1,000 pounds fertilizer were applied per acre, the mixture containing nitrate of soda and sulphate of ammonia as sources of nitrogen and those in which nitro chalk and urea were used, gave practically equal returns.

Where applications of 2,000 pounds per acre were made, the highest yield of merchantable potatoes was obtained where nitrate of soda and sulphate of ammonia were used as the sources of nitrogen. The mixture containing urea gave the second highest yield, followed by the mixture containing nitro chalk.

This is the second potato crop that has been grown in this experiment. When the results for two years from the different sources of nitrogen are summarized to include applications of 1,000 and 2,000 pounds per acre, the yields indicate a slightly higher yield from a mixture of nitrate of soda and sulphate of ammonia, followed closely by urea. The average yield where cyanamide was used was practically ten barrels per acre less than where the aforementioned sources of nitrogen were used. The mixture of cyanamide, basic slag and muriate of potash has given the lowest yield.

AMMO-PHOS FOR THE POTATO CROP

This experiment was begun in 1926 to determine the value of ammo-phos as a source of nitrogen and phosphoric acid in a three-year rotation of potatoes, oats and hay, with particular reference to the results from the potato crop. The equivalent of a 4-8-6 fertilizer mixture was prepared, using ammo-phos as a source of nitrogen and phosphoric acid in comparison with a mixture of nitrate of soda, sulphate of ammonia and superphosphate. Muriate of potash was used as a source of potash. Applications were made at the rate of 1,000 and 2,000 pounds per acre. The soil was a medium clay loam. Fertilizer was applied in the row and covered with earth. This experiment was carried on in quadruplicate 1/320 acre plots. Potatoes were planted June 15 and dug October 2. The results are shown in table 41.

TABLE 41.—AMMO-PHOS FOR THE POTATO CROP

Fertilizer used per acre	4-8-6 equivalent per acre	Per cent stand	Yield per acre		
			Merchantable	Small	Total
	lb.		lb.	lb.	lb.
Nitrate of soda, 133 pounds Sulphate of ammonia, 100 pounds Superphosphate, 500 pounds Muriate of potash, 120 pounds	1,000	94·27	13,960	2,960	16,920
Ammo-phos (20-40 grade), 186 pounds Ammo-phos (13-48 grade), 90 pounds Muriate of potash, 120 pounds	1,000	93·75	11,840	2,720	14,560
Checks	.....	98·43	6,420	2,660	9,080
Nitrate of soda, 266 pounds Sulphate of ammonia, 200 pounds Superphosphate, 1,000 pounds Muriate of potash, 240 pounds	2,000	90·97	17,333	1,920	19,253
Ammo-phos (20-40 grade), 370 pounds Ammo-phos (13-48 grade), 180 pounds Muriate of potash, 240 pounds	2,000	95·31	16,600	1,800	18,400
Checks	.....	98·43	6,420	2,660	9,080

NOTES ON RESULTS.—Where applications of 1,000 pounds per acre were made, the best results were obtained from the mixture containing nitrate of soda, sulphate of ammonia and superphosphate.

Where applications of 2,000 pounds per acre were made, the yield of merchantable potatoes was slightly in favour of the mixture containing nitrate of soda, sulphate of ammonia and superphosphate.

Where the results are summarized from applications of 1,000 and 2,000 pounds per acre, the results are in favour of the mixture containing nitrate of soda, sulphate of ammonia and superphosphate.

A summary of the results from the two rates of application for 1926 and 1928 shows an average merchantable crop of 18,743 pounds per acre where nitrate of soda, sulphate of ammonia and superphosphate were used as sources of nitrogen and phosphoric acid, and 17,430 pounds merchantable potatoes per acre where ammo-phos was used as a source of nitrogen and phosphoric acid.

NITROPHOSKA FOR THE POTATO CROP

Nitrophoska is a high analysis fertilizer which has just recently been placed on the market. Different formulae are obtainable. The formula used in this experiment was equivalent to a 15-30-15 mixture. Applications were made at the rate of 400 pounds per acre, which is equivalent to a ton of 3-6-3 mixture. This was compared with the equivalent of a ton of 3-6-3 mixture containing nitrate of soda, superphosphate and muriate of potash, and also the equivalent of the same formula containing sulphate of ammonia, superphosphate and muriate of potash. The experiment was carried on in clay loam and is to be continued in a three-year rotation of potatoes, oats and hay. The fertilizer was applied in the row and mixed with earth. The plots were 1/320 acre and replicated four times. Potatoes were planted on June 18 and harvested October 2. The results are shown in table 42.

TABLE 42—NITROPHOSKA FOR THE POTATO CROP

Fertilizer used per acre	Per cent stand	Yield per acre		
		Merchantable	Small	Total
		lb.	lb.	lb.
Nitrophoska	97·91	11,680	3,440	15,120
Nitrate of soda, 400 pounds Superphosphate, 750 pounds Muriate of potash, 120 pounds	97·39	11,520	2,680	14,200
Sulphate of ammonia, 300 pounds Superphosphate, 750 pounds Muriate of potash, 120 pounds	99·47	11,760	2,800	14,560
Average of checks	98·43	6,200	1,760	7,960

NOTE.—Yield of merchantable potatoes was practically the same where the different fertilizer mixtures were used, which would indicate that nitrophoska may prove to be valuable fertilizer for the New Brunswick potato growers.

PASTURE FERTILIZER EXPERIMENT

The grazing and fertilization experiment, begun at this Station in 1928, was modified and expanded for 1929. In 1928, this experiment was carried on to determine the value of a fertilizer treatment in which applications of nitrogen predominate, in a system of rotational grazing. In 1929, this experiment was enlarged so as to compare the system of rotational grazing with continuous grazing, fertilizers being used on all the areas. Continuous grazing with applications of fertilizers was also compared with continuous grazing without the application of fertilizers.

A fifteen-acre pasture field, which had been in pasture since 1917, was divided into six fields of 2·5 acres each. These were treated in the following manner:—

Plot 1 was rotationally grazed and fertilized with

350 pounds per acre superphosphate } Applied in November, 1928.
100 pounds per acre muriate of potash }
100 pounds per acre nitrate of soda, applied May 17, 1929.
50 pounds per acre nitrate of soda, applied June 15, 1929.

Plot 2 was rotationally grazed and fertilized with

350 pounds per acre superphosphate } Applied in November, 1928.
100 pounds per acre muriate of potash }
100 pounds per acre nitrate of soda, applied May 17, 1929.
50 pounds per acre nitrate of soda, applied June 19, 1929.

Plot 3 was rotationally grazed and fertilized with

350 pounds per acre superphosphate } Applied in November, 1928.
100 pounds per acre muriate of potash }
100 pounds per acre nitrate of soda, applied May 18, 1929.
50 pounds per acre nitrate of soda, applied June 21, 1929.

Plot 4 was rotationally grazed and fertilized with

350 pounds per acre superphosphate applied November, 1928.
100 pounds per acre muriate of potash applied November, 1928.
100 pounds per acre nitro-chalk applied May 18, 1929.
50 pounds per acre nitro-chalk applied June 26, 1929.

Plot 5 was continuously grazed and fertilized with

350 pounds per acre superphosphate applied November, 1928.
100 pounds per acre muriate of potash applied November, 1928.
100 pounds per acre nitro-chalk applied May 18, 1929.
50 pounds per acre nitro-chalk applied June 26, 1929.

Plot 6 was continuously grazed but not fertilized.

Rotational grazing means that the pasture area is divided into several fields—in this case four. Stock is grazed on one field until the growth is eaten down. This usually takes from three to five days, but is largely dependent upon the amount of stock on the field. When the herbage is eaten down in one field, the stock is moved on to the next and so on until the whole series of fields has been covered. This process is repeated throughout the season.

The rotationally grazed pastures grew well during the early season. Buttercups were the dominant weed, and since they are not relished by live stock, clumps of grasses with buttercups were left by the stock, so the pastures were mown in order to prevent an accumulation of mature grass and to stimulate the production of fresh young grass.

Plot 1 was mown June 26.
Plot 2 was mown June 29.
Plot 3 was mown July 2.
Plot 4 was mown July 8.

All plots were arranged so that the stock had access to shade and water during the early part of the season. Cows were turned out to pasture a few days previous to going on the exepriment plots May 31.

Milch cows were largely used for grazing. A few dry cows were necessarily carried. Heifers were used to clean up rotationally grazed plots after cows, during the early part of the season and in continuously grazed plots to keep up with growth, when it became advanced. Milch cows were taken off plots 1, 2, 3, 4 and 5 September 27, and off plot 6—August 24. Following September 27, dry cows and heifers were used for grazing, with sheep on continuously grazed plots during the latter end of the pasture season, which ended October 17 on rotationally grazed plots and October 25 on continuously grazed plots.

In view of the promising results obtained experimentally in 1928 from the system of rotational grazing, and because of the high nutritional value of young grass, it was deemed advisable during the present year to discontinue summer feeding of grain to our milch cows. Later in the season, it was considered advisable to feed a little meal to certain cows that were milking heavily and to cows approaching lactation. In the rotationally grazed area, a total of 42·1 pounds of grain per acre were fed, as compared with 679·1 pounds per acre in 1928. In the continuously grazed area, which was fertilized, a total of 71·2 pounds of grain per acre were fed.

A summary of the carrying capacity of pastures treated, as outlined, is shown in table 43.

TABLE 43—SUMMARY OF CARRYING CAPACITY OF PASTURES

Plots	Treatment	Grazing period	Carrying capacity cows per acre	Cow days per acre
		days		
1, 2, 3, 4	Rotationally grazed and fertilized	139·5	1·14	160·32
5	Continuously grazed and fertilized	138·5	1·45	201·1
6	Continuously grazed, not fertilized	134·5	0·82	110·5

A summary of this experiment for 1929 shows that fertilization of continuously grazed pastures resulted in a marked increase in the carrying capacity. Continuous grazing with fertilization gave better results than rotational grazing with fertilization.

The carrying capacity of the rotationally grazed pasture, viz., 1·14 cows per acre compared very closely with the results for 1928, viz., 1·13 cows per acre.

These results cannot be considered as conclusive. Further work must be done before definite conclusions can be drawn.

DIFFERENT SOURCES OF PHOSPHORIC ACID WHEN USED ALONE AND WITH NITRATE OF SODA AND MURIATE OF POTASH

This experiment was begun in 1926 to determine the value of fortified slag, Bessemer slag, Florida rock phosphate, Ephos rock phosphate and superphosphate as sources of phosphoric acid when used alone, and with nitrate of soda and muriate of potash, in a four year rotation of oats, hay, hay and hay. The soil is a clay loam, with a heavy clay subsoil. Each mixture was applied to quadruplicate plots of 1/320 acre each at a rate which gave the same amount of phosphoric acid in each mixture. The fertilizers used, rate, and the results obtained to date are shown in table 44.

TABLE 44—EXPERIMENT TO COMPARE THE VALUE OF DIFFERENT SOURCES OF PHOSPHORIC ACID WHEN USED ALONE AND WITH NITROGEN AND POTASH

Plot number	Treatment	Phosphoric acid per cent	Rate of application per acre	Average per acre 1926		Hay per acre 1927	Hay per acre 1928	Hay per acre 1929	Average yield hay, 3 years
				Straw	Grain				
			lb.	lb.	lb.	lb.	lb.	lb.	lb.
No nitrate of soda or muriate of potash									
1	Fortified slag	14·0	1,000	3,264	1,583	3,468	3,282	3,922	3,557
2	Bessemer slag	16·0	875	3,711	1,648	3,901	3,520	3,861	3,760
3	Florida rock phosphate	29·0	480	3,711	1,648	2,720	2,932	3,715	3,122
5	Ephos rock phosphate	27·5	510	3,447	1,588	3,354	3,561	4,015	3,643
6	Superphosphate	16·0	875	3,959	1,758	3,601	3,344	3,735	3,560
4	Check			3,696	1,756	2,665	2,993	3,361	3,006
With 100 pounds nitrate of soda and 50 pounds muriate of potash.									
7	Fortified slag	14·0	1,000	4,072	1,617	3,549	3,515	3,847	3,637
8	Bessemer slag	16·0	875	4,559	1,869	4,398	3,825	3,672	3,965
9	Florida rock phosphate	29·0	480	4,166	1,784	2,355	3,541	3,850	3,315
10	Ephos rock phosphate	27·5	510	4,049	1,636	3,051	3,679	4,135	3,621
11	Superphosphate	16·0	875	4,647	2,051	3,399	3,591	4,078	3,689
10	Check			4,990	1,862	2,985	3,501	4,044	3,510

NOTES ON RESULTS.—While the results are by no means conclusive, they seem to show that

(1) Bessemer slag gave slightly better yields of hay when used alone and when used with nitrate of soda and potash, than any of the other sources of phosphoric acid.

(2) Ephos rock phosphate gave better yields of hay than Florida rock phosphate.

(3) The results for Ephos rock phosphate show that it gave approximately the same yield of hay as superphosphate and fortified slag.

POULTRY

The stock on hand December 31, 1929 consisted of Barred Rocks: males 56, hens 444, chickens 48, Single Comb White Leghorns: males 3, hens 40, chickens 4, Black Bresse: males 1, hens 2.

The work carried on during the year was very largely a continuation of that carried on in previous years. Feeding, breeding and hatching experiments were conducted. The ninth New Brunswick Egg Laying Contest was concluded.

BEST DATE FOR INCUBATION

The hatching results from eggs set at different dates are shown in table 45.

TABLE 45—HATCHING RESULTS FROM SETTINGS OF DIFFERENT DATES

Items	Setting March 21	Setting March 31	Setting April 14	Setting April 19	Setting April 25	Setting May 10
Total eggs set	1,333·0	949·0	745·0	211·0	903·0	616·0
Number fertile	921·0	711·0	545·0	154·0	690·0	516·0
Per cent fertile	69·09	74·92	73·15	72·98	76·41	83·76
Number of chicks	395·0	372·0	324·0	26·0	324·0	261·0
Per cent total eggs hatched	29·63	39·19	43·48	12·32	35·88	42·37
Per cent fertile eggs hatched	42·88	52·32	59·44	16·88	46·95	50·58
Number of chicks alive when wing-banded	365·0	343·0	252·0	*	55·0†	*
Per cent chicks hatched alive when wing-banded	92·40	92·20	77·77	.....	25·34	.....
Total eggs required for one chick hatched	3·37	2·55	2·29	8·11	2·78	2·36
Total fertile eggs for one chick hatched	2·33	1·91	1·68	5·92	2·12	1·97
Total eggs required for one chick when wing-banded	3·65	2·76	2·95	.....	10·31‡	.....

*Sold as day-old chicks. †107 sold as day-old chicks, balance of chickens were largely taken by crows. ‡By deducting eggs set from which chicks sold were hatched.

The greatest fertility was obtained from the May 10 setting. The lowest fertility was obtained from the March 21 setting. The settings of intervening dates were quite uniform in fertility.

Hatchability, as shown by the percentage of fertile eggs hatched, was best from the April 14 setting, followed by settings of March 31 and May 10.

Viability, as shown by the percentage of chicks hatched that were alive when wing-banded, was greatest from the March 21 and 31 settings. Chickens hatched after the middle of April were quite largely disposed of as day old chicks. One lot hatched on April 25 suffered from the attacks of crows.

HATCHING RESULTS FROM HENS AND PULLETS

The hatching results from hens and pullets are shown in table 46.

TABLE 46—HATCHING RESULTS FROM HENS AND PULLETS

Items	Hens	Pullets
Total eggs set	2,864·0	1,893·0
Number fertile	2,248·0	1,289·0
Per cent fertile	78·49	68·09
Number of chicks	1,258·0	444·0
Per cent total eggs hatched	43·92	23·45
Per cent fertile eggs hatched	55·96	34·44
Number of chicks alive when wing-banded	742·0*	273·0†
Per cent chicks hatched alive when wing-banded	74·34	87·78
Total eggs required for one chick hatched	2·27	4·26
Total fertile eggs required for one chick hatched	1·78	2·90
Total eggs required for one chick when wing-banded	3·03	4·93

*Plus 260 sold as day old chicks. †Plus 133 sold as day old chicks. The fertility was highest from hens. The hatchability, as shown by the percentage of fertile eggs hatched, was decidedly in favour of hens as breeders.

SKIM-MILK VERSUS BEEF SCRAP VERSUS FISH MEAL

This experiment, which was begun in December 1925, was continued for a six months' period from December 1, 1928, to May 31, 1929, the object being to determine the relative value of these products as protein feeds for laying hens. Fifteen Barred Rock pullets were included in each pen at the beginning of the experiment and dead birds were not substituted. The system of feeding was as follows:—

All pens were fed a scratch grain mixture consisting of 200 pounds cracked corn, 200 pounds feed wheat and 100 pounds oats. Group 1 was fed a dry mash in hoppers consisting of 100 pounds wheat bran, 100 pounds wheat middlings, 100 pounds corn meal, 100 pounds crushed oats, 45 pounds beef scrap, 22·5 pounds bone char, 4·5 pounds salt and 5 pounds charcoal. Group 2 was fed a mash of the same composition as Group 1, excepting that the beef scrap was omitted and skim-milk was fed at the rate of one quart daily per fifteen birds. Group 3 was fed a mash similar to that of Group 1, excepting that fish meal was used instead of beef scrap.

A summary of the production from pens fed beef scrap versus skim-milk versus fish meal for the past four years is shown in table 47.

TABLE 47.—BEEF SCRAP VERSUS SKIM-MILK VERSUS FISH MEAL FOR EGG PRODUCTION, AVERAGE EGG PRODUCTION—6-MONTH PERIOD

Year	Beef scrap	Skim-milk	Fish-meal
1926	90·55	84·58	85·76
1927	75·85	96·54	91·38
1928	99·04	90·5	96·67
1929	87·95	89·24	84·33
Average	88·34	90·21	89·53

The average results for four years show a slightly higher production when skim-milk was fed. Fish Meal has been slightly superior to beef scrap.

Summary of Hatching Results for Four Years from Pullets fed Beef Scrap versus Fish Meal versus Skim-Milk

Fertility—

Regular mating—Highest where fish meal was fed, followed closely by skim-milk.

Males alternated—Highest where beef scrap was fed, followed by fish meal.

All matings—Highest where fish meal was fed, followed closely by skim-milk.

Hatchability—

Regular mating—Highest where skim-milk was fed, followed by beef scrap. Fish meal pen low.

Males alternated—Highest where beef scrap was fed. Results from fish meal and skim-milk similar.

All matings—Highest where beef scrap was fed, followed by skim-milk. Fish meal pen quite low.

Per cent total eggs hatched—

Regular mating—Highest where skim-milk was fed, followed by beef scrap. Fish meal pen low.

Males alternated—Highest where beef scrap was fed. Results from fish meal and skim-milk similar.

All matings—Highest where skim-milk and beef scrap were fed. The results from these two feeds were very similar. Fish meal pen low.

STANDARD (HOME-MIXED) RATION CONTAINING CORN VERSUS RATION CONTAINING BUCKWHEAT (REPLACING CORN)

This experiment was begun in 1926 to determine the value of home grown grains for poultry feeding, particularly the value of buckwheat replacing corn.

Group 1 was fed a standard ration of scratch grain consisting of 200 pounds cracked corn, 200 pounds feed wheat, 100 pounds of oats and a mash fed in hoppers, consisting of 100 pounds wheat bran, 100 pounds wheat middlings, 100 pounds corn meal, 100 pounds crushed oats, 20 pounds bone char, 4 pounds salt, 5 pounds charcoal. Grit, oyster shell, green feed, skim-milk and water were also supplied.

Group 2 was fed a ration of scratch grain consisting of 200 pounds feed wheat, 100 pounds buckwheat, 100 pounds oats and a mash fed in hoppers, consisting of 100 pounds wheat bran, 100 pounds wheat middlings, 100 pounds buckwheat meal, 100 pounds crushed oats, 20 pounds bone char, 4 pounds salt, 5 pounds charcoal. Grit, oyster shell, green feed, skim-milk and water were also supplied.

This experiment ran from December 1, 1928 to May 31, 1929. Fifteen Barred Rock pullets were in each pen at the beginning of experiment and birds that died were not substituted.

A summary of the production from birds fed corn versus buckwheat in the ration for the last four years is shown in table 48.

TABLE 48.—AVERAGE EGG PRODUCTION—6-MONTH PERIOD

Year	Standard ration	Ration with buckwheat replacing corn
1926	81·67	80·43
1927	89·85	96·01
1928	99·33	98·46
1929	89·24	71·57
Average	90·02	86·62

Buckwheat has always compared favourably with corn until the present year.

Summary of Hatching Results for Four Years from Pullets fed Standard Ration containing Corn versus Ration with Buckwheat replacing Corn

Fertility—

Regular mating—Highest where buckwheat replaced corn.
Males alternated—Highest where buckwheat replaced corn.
All matings—Highest where buckwheat replaced corn.

Percentage fertile eggs hatched—

Regular mating—Highest where corn was fed in the ration.
Males alternated—Highest where corn was fed in the ration.
All matings—Highest where corn was fed in the ration.

Percentage of total eggs hatched—

Regular mating—Highest where corn was fed in the ration.
Males alternated—Highest where corn was fed in the ration.
All matings—Highest where corn was fed in the ration.

POTATOES AS A SUBSTITUTE FOR CORN MEAL IN THE LAYING MASH

This experiment was begun in 1926 and has been continued for a six months' period in each year to determine the value of potatoes as a substitute for corn meal in the laying mash.

Group 1 was fed a standard ration of scratch grain consisting of 200 pounds cracked corn, 200 pounds feed wheat, 100 pounds oats and a mash fed in hoppers, consisting of 100 pounds wheat bran, 100 pounds wheat middlings, 100 pounds corn meal, 100 pounds crushed oats, 20 pounds bone char, 4 pounds salt, 5 pounds charcoal. Grit, oyster shell, green feed, skim-milk and water were also supplied.

Group 2 was fed the same scratch grain mixture as Group 1. Instead of receiving a dry mash, as Group 1, they were fed twice a day a moist mash consisting of 100 pounds wheat middlings, 100 pounds wheat bran, 100 pounds crushed oats, 15 pounds bone char, 3 pounds salt, and 5 pounds charcoal mixed with boiled potatoes. The proportions fed were two parts of potatoes (raw weight) to one part mash. Grit, oyster shell, skim-milk, green feed and water were also supplied.

This experiment was conducted from December 1, 1928 to May 31, 1929. Fifteen Barred Rock pullets were included in each pen at the beginning of the experiment.

A summary of the production from the birds fed potatoes as a substitute for corn meal in the laying mash is shown in table 49.

TABLE 49.—POTATOES AS A SUBSTITUTE FOR CORN MEAL IN LAYING MASH

—	Average egg production 6 months period	
	Corn meal in mash	Potatoes in mash
1926	85·96	83·71
1927	78·91	86·18
1928	82·41	96·19
1929	89·24	92·53
Average four years	84·13	89·65

The results indicate that potatoes are a valuable feed for egg production.

Summary of Hatching Results for Four Years from Pullets fed Standard Ration versus a Ration where Potatoes replaced Corn Meal in the Mash

Fertility—

Regular mating—Highest where potatoes replaced corn.
Males alternated—Highest where potatoes replaced corn.
All matings—Highest where potatoes replaced corn.

Hatchability—as shown by percentage fertile eggs hatched—

Regular mating—Highest where corn was fed in the ration.
Males alternated—Highest where potatoes replaced corn.
All matings—Highest where corn replaced potatoes.

Per cent total eggs hatched—

Regular mating—Highest where corn was fed in the ration.
Males alternated—Highest where potatoes replaced corn.
All matings—Slightly in favour of corn over potatoes.

TURNIPS VERSUS MANGELS VERSUS POTATOES FOR GREEN FEED

This experiment was begun in 1926 and continued during the present year. Three pens of Barred Rock pullets were used in this experiment which ran from December 1, 1928 to May 31, 1929. There were thirty birds in each pen at the beginning of the experiment and dead birds were not substituted. All groups were fed alike except for the green feed. The ration fed consisted of scratch grain made up of 200 pounds cracked corn, 200 pounds wheat, 100 pounds oats and a dry mash, fed in hoppers, made up of 100 pounds wheat bran, 100 pounds wheat middlings, 100 pounds corn meal, 100 pounds crushed oats, 50 pounds beef scrap, 25 pounds bone char, 5 pounds salt and 5 pounds charcoal.

Group 1 was fed mangels as green feed.
Group 2 was fed swedes as green feed.
Group 3 was fed potatoes as green feed.

A summary of the production from birds fed mangels versus swedes versus potatoes in the ration for the last four years is shown in table 50.

TABLE 50.—TURNIPS VERSUS MANGELS VERSUS POTATOES—AVERAGE EGG PRODUCTION

—	Mangels	Swedes	Potatoes
1926	55·62	65·35	61·50
1927	60·36	66·12	62·99
1928	84·16	85·21	88·55
1929	75·67	81·09	84·96
Average four years	68·95	74·44	74·5

The results indicate that swedes and potatoes were equal as green feed and also that they were superior to mangels.

Summary of Hatching Results for Four Years from Pullets fed different sources of Green Feed. Mangels versus Swedes versus Potatoes as a substitute for Green Feed

Fertility—

Regular mating—Highest where swedes were fed, followed by potatoes.

Males alternated—Highest where swedes were fed; mangels slightly better than potatoes.

All matings—Highest where swedes were fed, followed by potatoes.

Hatchability—as shown by percentage of fertile eggs hatched—

Regular mating—Highest where potatoes were fed. Results from mangels and swedes very similar.

Males alternated—Highest where mangels were fed, followed by potatoes.

All matings—Highest where potatoes were fed, followed by mangels.

Per cent total eggs hatched—

Regular mating—Highest where potatoes were fed, followed by swedes.

Males alternated—Highest where mangels were fed, followed closely by potatoes.

All matings—Highest where potatoes were fed, followed by mangels. The results from swedes practically equal to mangels.

FEEDS FOR FERTILITY, HATCHABILITY, AND VIABILITY

This experiment was begun in 1926 to determine the value of supplementary feeds such as cod liver oil, raw liver, bone meal, and various combinations of these when fed to breeding hens. Bone meal was not fed alone during the present year. The system of feeding was as follows:—

Group 1 was used as a check and was fed a standard ration of scratch grain with mash in hoppers. Scratch grain consisted of 200 pounds cracked corn, 200 pounds wheat, and 100 pounds oats. The mash consisted of 100 pounds corn meal, 100 pounds wheat middlings, 100 pounds wheat bran, 100 pounds crushed oats, 50 pounds beef scrap, and 5 pounds charcoal. Grit and oyster shell were supplied in hoppers and mangels were fed as green feed. Some milk was supplied and water was always available.

Group 2 was fed the same as the check with the addition of one-quarter teaspoon of cod liver oil per bird daily. The cod liver oil was fed in a moist mash of the same composition as that fed in the hopper.

Group 3 was fed the same as the check with the addition of one-half ounce of raw liver per bird daily. The liver was chopped fine and fed in a wet mash. The liver used was largely from pigs.

Group 4 was fed the same as the check with the addition of a quarter ounce of raw liver and one-eighth teaspoon cod liver oil per bird per day.

Group 5 was fed the same as check with the addition of a quarter ounce raw liver and one-eighth teaspoon cod liver oil per bird per day. Two and one-half per cent bone meal was added to the mash. Liver and cod liver oil were fed in a moist mash.

The experiment was divided into two periods, with a week between them. During the first period the hens in each pen were mated to the male bird assigned to their particular pen. During the second period the male birds were changed from pen to pen daily. They were allowed to alternate for a week before the eggs were saved for the second period. The results are shown in table 51.

TABLE 51.—FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY

Pen	Feed	Mating period	Eggs set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched
Group 1...	Check.....	Regular mating...	111	88	38	79·27	43·18	34·23
		Males alternated..	33	29	7	87·87	24·13	21·21
		Total.....	144	117	45	81·25	38·46	31·25
Group 2...	Cod liver oil....	Regular mating...	181	146	83	80·66	56·84	45·85
		Males alternated..	67	60	35	89·55	58·33	52·23
		Total.....	248	206	118	83·06	57·28	47·58
Group 3...	Liver.....	Regular mating...	119	91	65	76·47	71·42	54·62
		Males alternated..	33	24	12	72·72	50·0	36·36
		Total.....	152	115	77	75·65	66·95	50·65
Group 4...	Cod liver oil and liver.	Regular mating...	163	143	60	87·73	41·95	36·80
		Males alternated..	49	46	21	93·87	45·65	42·85
		Total.....	212	189	81	89·15	42·85	38·20
Group 5...	Cod liver oil, liver and bone meal.	Regular mating...	177	125	73	70·62	58·40	41·24
		Males alternated..	56	45	29	80·35	64·44	51·78
		Total.....	233	170	102	72·96	60·0	43·77

FEEDS FOR FERTILITY, HATCHABILITY, AND VIABILITY

This experiment has been carried on with cod liver oil, liver, and a combination of cod liver oil and liver for four years. The combination of cod liver oil, liver, and bone meal has only been tested for three years. A summary of the results is shown in tables 52 and 53.

TABLE 52—SUMMARY OF HATCHING RESULTS—FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY

	Regular mating					Males alternated					All matings				
	1926	1927	1928	1929	Four years' results	1926	1927	1928	1929	Four years' results	1926	1927	1928	1929	Four years' results
CHECK															
Total eggs set	378·0	182·0	214·0	111·0	885·0	56·0	32·0	42·0	33·0	163·0	434·0	214·0	256·0	144·0	1,048·0
Number fertile	294	167	198	88	747	53	24	37	29	143	347	191	235	117	890
Per cent fertile	77·77	91·75	92·52	79·27	84·40	94·64	75·0	88·09	87·87	87·73	79·95	89·25	91·79	81·25	84·92
Number of chicks	33	36	66	38	173	19	9	25	7	60	52	45	91	45	233
Per cent total eggs hatched	8·73	19·78	30·84	34·23	19·54	33·92	28·12	59·52	21·21	36·80	11·98	21·02	35·54	31·25	22·23
Per cent fertile eggs hatched	11·22	21·55	33·33	43·18	23·15	35 84	37·5	67·57	24·13	41·95	14·98	23·56	38·72	38·46	26·17
COD LIVER OIL															
Total eggs set	301	337	227	181	1,046	25	64	48	67	204	326	401	275	248	1,250
Number fertile	266	316	209	146	937	24	62	46	60	192	290	378	255	206	1,129
Per cent fertile	88·37	93·76	92·07	80·66	89·57	96·0	96·87	95·83	89·55	94·11	88·95	94·26	92·72	83·06	90·32
Number of chicks	124	124	90	83	421	6	33	29	35	103	130	157	119	118	524
Per cent total eggs hatched	41·19	36·79	39·64	45·85	40·24	24·0	51·56	60·41	52·23	50·49	39·87	39·15	43·27	47·58	41·92
Per cent fertile eggs hatched	46·61	39·24	43·06	56·84	44·93	25·0	53·22	63·04	58·33	53·64	44·82	41·53	46·66	57·28	46·41
LIVER															
Total eggs set	259	160	264	119	802	61	31	59	33	184	320	191	323	152	986
Number fertile	229	134	212	91	666	54	24	56	24	158	283	158	268	115	824
Per cent fertile	88·41	83·75	80·30	76·47	83·04	88·52	77·41	94·91	72·72	85·86	88·43	82·72	82·97	75·65	83·56
Number of chicks	38	28	123	65	254	21	5	43	12	81	59	33	166	77	335
Per cent total eggs hatched	14·67	17·50	46·59	54·62	31·67	34·42	16·12	72·88	36·36	14·02	18·43	17·27	51·39	50·65	33·97
Per cent fertile eggs hatched	16·59	20·89	58·02	71·42	38·13	38·88	20·83	76·78	50	51·26	20·84	20·88	61·94	66·95	40·65
COD LIVER OIL AND LIVER															
Total eggs set	280	374	277	163	1,094	80	51	51	49	231	360	425	328	212	1,325
Number fertile	268	333	261	143	1,005	77	47	48	46	218	345	380	309	189	1,223
Per cent fertile	95·71	89·03	94·22	87·73	91·86	96·25	92·15	94·11	93·87	94·37	95·83	89·41	94·20	89·15	92·30
Number of chicks	134	149	146	60	489	42	26	35	21	124	176	175	181	81	613
Per cent total eggs hatched	47·85	39·83	52·70	36·80	44·69	52·50	50·98	68·62	42·85	53·37	48·88	41·17	55·18	38·20	46·26
Per cent fertile eggs hatched	50·0	44·74	55·93	41·95	48·65	54·54	55·31	72·92	45·65	56·88	51·01	46·05	58·57	42·85	50·12

Fertility—
Regular mating—Highest where cod liver oil and liver were fed, followed by cod liver oil.
Males alternated—Highest where cod liver oil and liver were fed, with similar results from cod liver oil.
All matings—Highest where cod liver oil and liver were fed, followed by cod liver oil.

Hatchability—
Regular mating—Highest where cod liver oil and liver were fed, followed by cod liver oil.
Males alternated—Highest where cod liver oil and liver were fed, followed by cod liver oil.
All matings—Highest where cod liver oil and liver were fed, followed by cod liver oil.

Per cent total eggs hatched—
Regular mating—Highest where cod liver oil and liver were fed, followed by cod liver oil.
Males alternated—Highest where cod liver oil and liver were fed, followed by cod liver oil.
All matings—Highest where cod liver oil and liver were fed, followed by cod liver oil.

TABLE 53—SUMMARY OF HATCHING RESULTS—FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY

—	Regular mating				Males alternated				All matings			
	1927	1928	1929	Three years' results	1927	1928	1929	Three years' results	1927	1928	1929	Three years' results
CHECK												
Total eggs set	182	214	111	507	32	42	33	107	214	256	144	614
Number fertile	167	198	88	453	24	37	29	90	191	235	117	543
Per cent fertile	91·75	92·52	79·27	89·34	75·0	88·09	87·87	84·11	89·25	91·79	81·26	88·43
Number of chicks	36	66	38	140	9	25	7	41	45	91	45	181
Per cent total eggs hatched	19·78	30·84	34·23	27·61	28·12	59·52	21·21	38·31	21·02	35·54	31·25	29·47
Per cent fertile eggs hatched	21·55	33·33	43·18	30·90	37·5	67·57	24·13	45·55	23·56	38·72	38·46	33·33
COD LIVER OIL AND LIVER												
Total eggs set	374	277	163	814	51	51	49	151	425	328	212	965
Number fertile	333	261	143	737	47	48	46	141	380	309	189	878
Per cent fertile	89·03	94·22	87·73	90·54	92·15	94·11	93·87	93·37	89·41	94·2	89·15	90·98
Number of chicks	149	146	60	355	26	35	21	82	175	181	81	437
Per cent total eggs hatched	39·83	52·7	36·80	43·61	50·98	68·62	42·85	54·30	41·17	55·18	38·20	45·28
Per cent fertile eggs hatched	44·74	55·93	41·95	48·16	55·31	72·92	45·65	58·15	46·05	58·57	42·85	49·77
COD LIVER OIL, LIVER, BONE MEAL												
Total eggs set	320	243	177	740	47	58	56	161	367	301	233	901
Number fertile	263	184	125	572	41	56	45	142	304	240	170	714
Per cent fertile	82·18	75·72	70·62	77·29	87·23	96·55	80·35	88·19	82·83	79·73	72·96	79·24
Number of chicks	152	79	73	304	25	34	29	88	177	113	102	392
Per cent total eggs hatched	47·5	32·52	41·24	41·08	53·19	58·62	51·78	54·65	48·22	37·54	43·77	43·5
Per cent fertile eggs hatched	57·79	42·93	58·4	53·14	60·97	60·71	64·44	61·97	58·22	47·08	60·0	54·90

Fertility—
Regular mating.....Highest where cod liver oil and liver were fed. The results from cod liver oil, liver and bone meal were lower than the check.
Males alternated.....Highest where cod liver oil and liver were fed.
All matings.....Highest where cod liver oil and liver were fed; lowest where cod liver oil, liver and bone meal were fed.

Hatchability—as shown by percentage of fertile eggs hatched—
Regular mating.....Highest where cod liver oil, liver and bone meal were fed.
Males alternated.....Highest where cod liver oil, liver and bone meal were fed.
All matings.....Highest where cod liver oil, liver and bone meal were fed.

Percentage total eggs hatched—
Regular mating.....Highest where cod liver oil, and liver were fed.
Males alternated.....Results similar from cod liver oil and liver as compared with cod liver oil, liver and bone meal.
All matings.....Highest where cod liver oil and liver were fed.

FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY, HEAVY VERSUS LIGHT RATION

This experiment was begun in 1928 and continued in 1929, the object being to determine the relative merits of a heavy and a light ration for breeding hens. The birds were placed on their respective rations on January 1, 1928, and January 20, 1929.

Group 1 was fed according to the usual methods of feeding at this Station, as follows: scratch grain mixture—200 pounds cracked corn, 200 pounds wheat and 100 pounds oats. A dry mash consisting of 100 pounds wheat middlings, 100 pounds wheat bran, 100 pounds corn meal, 100 pounds crushed oats, 5 pounds salt, 5 pounds charcoal, 25 pounds bone char (from January 20 to February 28), 50 pounds beef scrap.

Group 2 was fed a modified ration as follows: scratch grain—200 pounds wheat, 200 pounds oats, 100 pounds cracked corn. A dry mash consisting of 100 pounds wheat middlings, 100 pounds wheat bran, 100 pounds crushed oats, 36 pounds beef scrap, 3 pounds salt, 4 pounds charcoal, 18 pounds bone meal (January 20 to February 28). Birds in Group 2 were fed all the green feed they would consume. Green feed was also supplied daily to Group 1. Both groups received grit, oyster shell and water.

The hatching records were taken for two periods with a week between each period. In the first period the birds were mated with the male bird assigned to their pen, whereas in the second period the male birds were changed from pen to pen daily. Alternation of males was allowed for a week before the eggs were saved for the second period.

The feed consumed and the average production per bird is shown in table 54. The hatching results for each period of the present season, also in the previous season, as well as a summary to date are shown in table 55.

TABLE 54.—FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY—HEAVY VERSUS LIGHT RATION

—	Heavy ration			Light ration			
	Group 1			Group 2			
	Pen 16	Pen 17	Average	Pen 18	Pen 19	Pen 20	Average
Number of birds in experiment at beginning	12·0	12·0	.....	11·0	10·0	12·0	
Number of days in experiment	114·0	114·0	114·0	114·0	114·0	114·0	114·0
Scratch feed eaten per bird	22·85	21·53	22·19	11·27	11·36	12·13	11·58
Mash eaten per bird	12·50	10·25	11·38	17·65	18·95	17·73	18·11
Green feed eaten per bird	9·67	9·49	9·58	13·43	14·20	14·49	14·04
Average weight of birds at beginning of experiment	6·6	6·74	6·67	6·65	6·53	5·78	6·32
Average weight per bird at end of experiment	6·66	6·88	6·77	6·48	6·12	6·02	6·20
Average gain per bird	0·06	0·14	0·10	−0·17	0·41	0·24	−0·12
Production by months							
January 20–31	2·33	1·33	1·83	0·90	3·20	2·58	2·22
February	5·91	7·08	6·49	4·91	6·58	6·41	5·96
March	14·44	12·5	13·47	10·91	12·09	14·44	12·48
April	20·0	17·83	18·91	15·75	14·90	19·55	16·73
May 15	8·66	7·75	8·20	6·66	7·45	8·44	7·51
Egg production per bird for period	51·34	46·49	48·9	39·13	44·22	51·42	44·90

TABLE 55—FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY, HEAVY VERSUS LIGHT RATION

—	Regular mating			Males alternated			All matings		
	1928	1929	Results two years	1928	1929	Results two years	Average season 1928	Average season 1929	Results two years
Standard Ration									
Total eggs set	377·0	358·0	735·0	86·0	104·0	190·0	463 0	462·0	925·0
Number fertile	335·0	248·0	583·0	83·0	94·0	177·0	418·0	342·0	760·0
Per cent fertile	88·85	69·27	79·31	96·51	90·38	93·15	90·28	74·02	82·16
Number of chicks	85·0	177·0	262·0	45·0	51·0	96·0	130·0	228·0	358·0
Per cent total eggs hatched	22·54	49·44	35·64	52·32	49·03	50·52	28·07	49·35	38·7
Per cent fertile eggs hatched	25·37	71·37	44·93	54·21	54·25	54·23	31·10	66·66	47·1
Light Ration									
Total eggs set	664·0	528·0	1,192·0	140·0	151·0	291·0	804·0	679·0	1,483·0
Number fertile	623·0	430·0	1,053·0	132·0	126·0	258·0	755·0	556·0	1,311·0
Per cent fertile	93·82	81·43	88·33	94·28	83·44	88·65	93·90	81·88	88·40
Number of chicks	293·0	262·0	555·0	101·0	64·0	165·0	394·0	326·0	720·0
Per cent total eggs hatched	44·12	49·62	46·56	72·14	42·38	56·70	49·0	48·01	48·55
Per cent fertile eggs hatched	47·03	60·93	52·70	76·51	50·79	63·95	52·18	58·63	54·91

FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY, HEAVY VERSUS LIGHT RATION

Fertility—

Regular mating—Highest where birds were fed a light ration.
Males alternated—Highest where birds were fed standard ration.
All matings—Highest where birds were fed light ration.

Hatchability—as shown by percentage of fertile eggs hatched—

Regular mating—Highest where birds were fed light ration.
Males alternated—Highest where birds were fed light ration.
All matings—Highest where birds were fed light ration.

Percentage of total eggs hatched—

Regular mating—Highest where birds were fed light ration.
Males alternated—Highest where birds were fed light ration.
All matings—Highest where birds were fed light ration.

CONTROL OF FOWL TYPHOID

Agglutination tests for fowl typhoid were made in February and October. This is the sixth year that this test has been made. In February a relatively high percentage of reactors was obtained whereas the October test was the lowest to date. The results are shown in table 56.

TABLE 56.—RESULTS OF TESTS FOR FOWL TYPHOID

—	Number tested	Number reacted
February Test—		
Hens	137	17
Cocks	7	1
Pullets	299	28
Cockerels	29	.....
October test—		
Hens	198	3
Cocks	30	.....
Pullets	515	4
Cockerels	179	.....

The percentage of reactors since this test was begun is as follows:—

	Per cent
1924	34·4
1925	3·93
1926	9·8
1927	20·41
1928, February	7·37
1928, October	1·05
1929, February	9·74
1929, October	0·75

EGG LAYING CONTEST

The ninth New Brunswick Egg Laying Contest was concluded on October 22. Twenty pens of ten birds each competed in this contest. Two spare birds accompanied the original pen for substitution when necessary. The score system begun in 1926, to take size of eggs into consideration, was continued in effect during the year.

Registration was on the same basis as in previous years. Hens laying two hundred eggs or over averaging 24 ounces per dozen qualified for registration providing they were typical of the breed they represented.

Ninety-four birds laid 200 or more eggs.

Ninety-seven birds had a credit of 200 or more points.

Seventy-four birds, including five spares, qualified for registration.

Three White Wyandottes, three Single Comb White Leghorns and sixty-eight Barred Rocks were registered.

Forty-one hens, including four spares, died during the year.

Sixty second generation birds were entered in the contest. Twelve of these died. Twenty-three of these qualified for registration.

One second generation spare set up to replace an original contest bird qualified for registration.

The average production for the year, as well as for each year since the contest began, was as follows:—

TABLE 57.—AVERAGE PRODUCTION NEW BRUNSWICK EGG LAYING CONTESTS

Year	Eggs	Points
1921	152·13	.....
1922	139·43	.....
1923	162·25	.....
1924	165·00	.....
1925	164·7	.....
1926	183·38	185·58
1927	171·54	176·85
1928	186·4	194·7
1929	183·1	190·6

TABLE 58.—THE AVERAGE PRODUCTION FOR THE DIFFERENT BREEDS

Breed	Eggs	Points
Barred Plymouth Rocks	195·61	202·55
White Wyandottes	145·25	160·66
Single Comb White Leghorns	121·6	125·46

TABLE 59.—HIGHEST PRODUCING PENS

Name	Address	Breed	Eggs	Points
A. T. Reed	Rollingham	B.R.	2,326	2,558·5
W. A. Sansom	Durham Bridge	B.R.	2,239	2,347·7
John Woods	Bloomfield	B.R.	2,240	2,317·0

The list of contestants and individual records of the birds are shown in table 60. The upper line denotes egg production and lower line denotes points.

TABLE 60—NINTH NEW BRUNSWICK EGG LAYING CONTEST

Pen	Name	Address	Breed	1	2	3	4	5	6	7	8		10	Total	Spare No. 1	Spare No. 2
1	Mrs. George Danby	North Devon	W.W.	*161·0	15·0	110·0	200·0	135·0	97·0	124·0	d94·0	136·0	175·0	1,247·0	.....	.....
				158·3	12·4	109·6	240·8	166·9	98·4	152·6	102·3	161·0	211·0	1,413·3	.....	.....
2	Mrs. R. H. Moxon	Fredericton R.R. 2	W.W.	*170·0	138·0	156·0	194·0	206·0	145·0	164·0	226·0	156·0	*103·0	1,658·0	.....	.....
				175·6	155·5	153·7	243·1	196·3	155·3	148·5	276·4	190·9	104·7	1,800·0	.....	.....
3	Wm. A. Sansom	Durham Bridge	B.R.	224·0	226·0	210·0	205·0	236·0	154·0	209·0	224·0	258·0	293·0	2,239·0	154·0	217·0
				221·8	245·4	189·7	226·9	243·9	174·3	198·4	242·6	259·5	345·2	2,347·7	164·7	178·4
4	John Moore	Mouth Keswick	B.R.	198·0	174·0	201·0	213·0	166·0	209·0	261·0	214·0	241·0	202·0	2,079·0	244·0	218·0
				246·1	212·2	188·7	174·2	160·7	242·7	277·6	206·8	206·6	175·0	2,090·6	176·8	247·4
5	Experimental Station	Fredericton	B.R.	185·0	253·0	234·0	210·0	191·0	*186·0	207·0	187·0	252·0	168·0	2,073·0	.....	236·0
				181·5	199·1	260·7	237·9	179·8	203·5	248·4	211·8	241·0	168·5	2,132·2	.....	228·3
6	C. E. Gunter	Upper Gagetown	B.R.	244·0	162·0	176·0	*220·0	171·0	95·0	211·0	*164·0	231·0	141·0	1,815·0	.....	.....
				238·5	158·5	138·5	234·6	159·2	86·8	238·3	168·5	247·3	123·4	1,793·6	.....	.....
7	Harry Patterson	Hoyt	B.R.	220·0	d198·0	179·0	249·0	192·0	240·0	235·0	*64·0	232·0	*d 150·0	1,959·0	.....	.....
				245·2	257·4	204·0	205·0	232·6	271·5	265·2	73·0	249·7	173·6	2,177·2	.....	.....
8	N. W. Eveleigh	Sussex	B.R.	d120·0	221·0	*150·0	*249·0	*185·0	142·0	189·0	142·0	d168·0	241·0	1,807·0	.....	.....
				98·2	165·4	177·7	248·7	184·0	167·1	175·2	127·1	180·4	293·7	1,817·5	.....	.....
9	James Monohan	Elmsville	B.R.	*196·0	220·0	214·0	223·0	204·0	d145·0	196·0	232·0	153·0	184·0	1,967·0	.....	.....
				194·3	268·0	256·5	197·4	213·2	144·5	190·1	224·3	194·9	228·5	2,111·7	.....	.....
10	A. T. Reed	Rollingdam	B.R.	260·0	233·0	244·0	268·0	204·0	210·0	177·0	226·0	244·0	260·0	2,326·0	216·0	.....
				314·6	268·8	226·7	287·1	245·2	260·4	180·2	206·5	267·9	301·1	2,558·5	209·9	.....
11	John Woods	Bloomfield	B.R.	183·0	236·0	201·0	239·0	245·0	229·0	196·0	211·0	209·0	291·0	2,240·0	181·0	148·0
				194·3	230·8	225·3	231·3	253·4	213·3	225·4	253·6	239·4	250·2	2,317·0	185·1	117·9
12	Mrs. Edward Hart	Grand Bay	B.R.	178·0	170·0	140·0	218·0	241·0	226·0	227·0	d*149·0	220·0	186·0	1,955·0	.....	.....
				172·7	160·7	127·3	253·5	227·0	272·3	264·7	154·0	262·5	221·6	2,116·3	.....	.....
13	Begin & Dube	Edmundston	B.R.	219·0	202·0	145·0	242·0	146·0	240·0	160·0	205·0	142·0	199·0	1,900·0	182·0	.....
				218·2	200·9	178·5	189·8	168·1	242·7	180·0	251·9	147·6	246·0	2,023·7	210·4	.....
14	G. M. Avard	Sackville	B.R.	190·0	159·0	222·0	*220·0	225·0	d33·0	143·0	171·0	114·0	178·0	1,655·0	.....	174·0
				197·8	195·2	233·2	195·3	249·1	39·1	162·3	219·4	119·9	150·0	1,761·3	.....	172·8
15	Everlay Poultry Farm	Lewisville	B.R.	d108·0	148·0	141·0	73·0	*56·0	238·0	230·0	267·0	*d167·0	d3·0	1,431·0	.....	.....
				96·2	124·5	117·6	76·4	49·7	250·3	297·6	243·0	154·2	2·8	1,412·3	.....	.....
16	Fundy Fur and Feather Farm	Saint John	B.R.	225·0	d146·0	155·0	149·0	*80·0	211·0	178·0	189·0	233·0	240·0	1,806·0	.....	182·0
				242·9	117·3	141·1	137·5	80·6	166·8	229·9	216·9	250·1	240·9	1,824·0	.....	181·4
17	John S. Knox	Sussex	B.R.	224·0	225·0	147·0	206·0	251·0	185·0	220·0	161·0	182·0	168·0	1,969·0	219·0	142·0
				181·8	234·1	128·0	255·5	247·3	179·9	276·7	173·7	165·6	162·5	2,005·1	249·5	138·3
18	Clarence R. Searle	Centre Napan	B.R.	208·0	153·0	190·0	229·0	243·0	234·0	172·0	221·0	220·0	208·0	2,078·0	88·0	178·0
				170·1	147·2	191·0	234·4	198·6	251·0	142·0	191·9	187·6	206·8	1,920·6	73·3	144·3
19	Lakewood Poultry Farm	Lakewood	S.C.W.L.	191·0	211·0	d42·0	119·0	213·0	201·0	d117·0	86·0	*30·0	*191·0	1,401·0	.....	.....
				223·6	264·4	35·0	110·7	210·9	183·3	122·8	76·5	33·7	189·9	1,450·8	.....	.....
20	Miss Helen Parks	Saint John	S.C.W.L.	90·0	d	128·0	d64·0	123·0	d*142·0	119·0	123·0	171·0	71·0	1,031·0	.....	.....
				82·1	.....	144·3	71·6	132·1	134·9	113·6	148·5	174·2	57·1	1,058·4	.....	.....

* Production of two birds. d Dead.

INFLUENCE OF TEMPERATURE ON EGG PRODUCTION

In order to determine the influence of temperature upon egg production during the winter months, a chart has been prepared showing the minimum temperature for each day and the egg production from two hundred hens in the New Brunswick Egg Laying Contest. These records cover the period from December 1, 1928, to February 28, 1929. This is shown as follows:—

BREEDING FOR EGG SIZE

In 1926 experiments were begun to determine the influence of breeding on egg size. The results for 1926 and 1927 are recorded in the detailed report for those years. This experiment was continued in 1928, when a cockerel with ancestors laying large eggs was mated to hens laying small eggs and companion hens laying eggs that averaged twenty-four or more ounces per dozen. The results are shown in table 61.

TABLE 61—BREEDING FOR EGG SIZE, 1928

Mating male bird from ancestors laying large eggs (1) to hens laying large eggs, (2) to hens laying small eggs. Cockerel Leg Band L 16, Wing Band L 360, out of N.B. LCD 66, with a record of 140 eggs averaging 26 ounces per dozen, and sired by a male bird out of J 40 that laid 144 eggs averaging 27·11 ounces per dozen, was mated as follows:—

Mated to Number	Egg record	Egg weight	Progeny number	Weight pullet	Egg record	Began to lay	Egg weight	Egg weight recorded
		oz.		lb.			oz.	
(1) *Large egg, hens*								
J 33	132	25·25	M 230	5·5	149	Dec. 3	25·08	Dec. to April, June to Oct. incl.
			93	5·6	142	Dec. 2	27·81	Dec., Feb., April to Oct., incl.
K 137	170	24·1	189	5·8	132	Jan. 8	24·72	Jan. to June incl. Sept.
K 149	162	25·55	283	5·7	64	Mar. 16	26·08	Mar. to Aug. incl.
Average		24·96				Average	25·92	
(2) *Small egg, hens*								
K 65	218	22·74	M 194	6·2	22*	Dec. 15	24·33	Dec. Feb., March.
96	184	22·94	112	7·0	186	Nov. 22	25·24	Nov. to Aug. incl.
			211	5·3	136	Feb. 11	26·37	Feb. to Sept. incl.
			246	5·2	106	Dec. 7	24·59	Dec. to June, incl.
			281	5·0	10	Feb. 22	23·25	Feb., March.
K 98	250	22·9	102	5·7	172	Dec. 5	25·02	Dec. to July, incl. Oct.
			34	6·2	49*	Nov. 26	22·89	Nov., Dec., Feb., March.
			150	6·7	145	Nov. 8	25·46	Nov., Jan. to Oct., incl.
			243	5·0	192	Dec. 8	27·34	Dec. to Sept., incl.
			278	4·9	49	Mar. 17	26·83	Mar., April, May, Aug.
K 219	151	22·53	220	5·0	46†	Feb. 13	24·33	Feb., March, April.
			240	4·8	37‡	April 16	29·22	April, May, Juns.
Average		22·77				Average	25·40	

*Reacted and sold in March. †Sold June. ‡Sold October.

The results show a marked increase in egg size of the progeny, when a cockerel with ancestors laying large eggs was mated to females laying small eggs.

BREEDING FOR EGG SIZE IN SECOND GENERATION—1928

In 1926 a number of hens laying small eggs were mated to cockerels whose dams laid large eggs. From the female progeny of these matings a number of hens laying the best eggs were kept over to be mated to males whose ancestors laid large eggs. The results from these matings are shown in table 62.

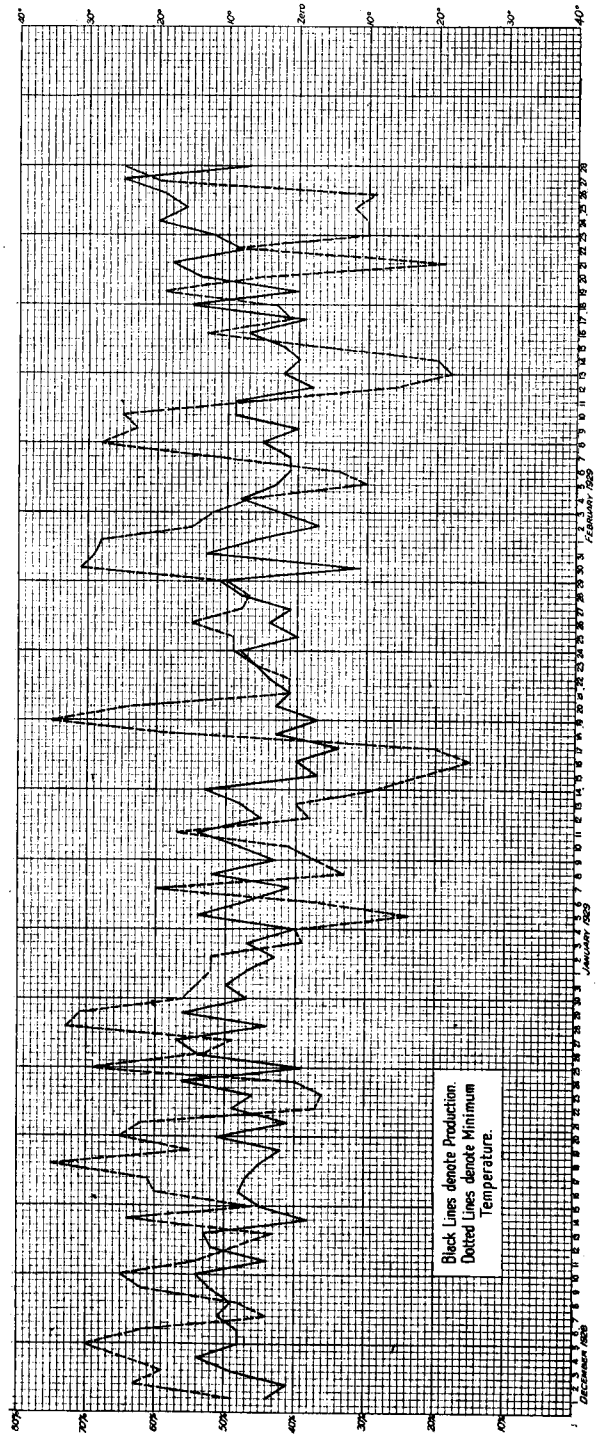

Black Lines denote Production.
Dotted Lines denote Minimum Temperature.

TABLE 62—BREEDING FOR EGG SIZE

1928 Breeding—to obtain pullets (bred originally from small egg hens) whose sire has for two generations been selected for large egg size in pedigree. Cockerel from ancestors that laid large eggs, mated to females sired by males out of hens that laid large eggs and out of hens that laid small eggs.

Male Number	Egg weight dam	Egg weight paternal grand dam	Mated to	Egg weight	First generation progeny Number	Egg record	Egg weight	Mated to male	Egg weight dam	Egg weight paternal grand dam	Second generation progeny Number	Egg weight	Egg record	Egg weights recorded
		oz.		oz.			oz.		oz.	oz.		oz.		
J 467	24·57	27	LCE 230	22·44	K 12	144	22·0	L 14	26·42	25·11	M275	23·39	130	Feb.-Oct. incl.
											291	23·0	10*	Feb.-Mar.
J 288	25·82	27	LCD 208	21·5	K 22	178	23·4	L 14	26·42	25·11	M 87	25·38	151	Jan.-Aug. incl.
											253	25·02	170	Jan.-Oct. incl.
J 726	29·0	−24	I 55	23·33	K 23	154	23·03	L 14	26·42	25·11	M 226	24·71	199	Jan.-Oct. incl.
											256	25·54	178	Jan.-Oct. incl.
J 726	29·0	−24	I 57	22·62	K 32	150	25·72	L 14	26·42	25·11	M 1	26·53	68*	
											236	26·30	185	Jan.-Oct. incl.
J 726	29·0	−24	I 5	22·68	K 54	204	24·22	L 14	26·42	25·11	M 228	25·23	217	Dec.-Oct. incl.
J 726	29·0	−24	I 96	22·81	K 77	166	24·65	L 14	26·42	25·11	M 193	23·88	174	Nov. Sept. incl.
											PEILC 67	24·0	270	Nov.-Oct. incl.
J 726	29·0	−24	I 96	22·81	K 84	175	23·62	L 14	26·42	25·11	M 107	26·75	33*	Nov.-Feb. incl.
											8	28·11	141	Nov.-Sept. incl.
J 726	29·0	−24	I 55	23·33	K 85	180	22·81	L 14	26·42	25·11	M 24	25·62	152	Jan., Mar.-Sept. in.
J 726	29·0	−24	I 96	22·81	K 134	142	26·23	L 14	26·42	25·11	M 184	26·94	213	Dec., Feb.-Oct. incl.
											265	25·68	157	Jan.-Sept., incl.
J 726	29·0	−24	I 55	23·33	K 244	172	24·47	L 14	26·42	25·11	M 288	25·9	197	Feb.-Oct. incl.
								L 14	26·42	25·11	M 25	28·42	105	Feb. Aug. incl.
											295	23·56	139‡	Feb. Oct. incl.
Average				22·76			24·01					25·47		

*Reacted, sold in March. ‡Died in November. The results show a progressive increase in egg size.

In recent years our breeding operations have been largely confined to Barred Rocks. This is the most popular breed in the province. It has gained rapidly in popularity and many flocks have achieved national recognition in our Egg Laying Contests. For several years we have concentrated on the development of a high producing, large size, well marked, typical strain of this breed. Egg size has also been carefully considered. All of our flock is trap nested and the majority of the birds are of known breeding. An effort has been made to confine our breeding operations to birds of a definite standard. While the value of selection in breeding practice is acknowledged, its limitations in live stock breeding are recognized, due to the heterozygous nature of the parents and the resultant variation in the off-spring. The dominance of certain economic characteristics in live stock has frequently been observed in certain families and many sires have become famous through their ability to transfer definite factors to the majority of their progeny. The progeny test has thus become the acid test for successful breeding operations.

In our poultry breeding work at this Station, the progeny test is the major feature of our breeding operations. Along with this, we have followed the system of line breeding. In order to illusrate the value of certain males over others, the records of the progeny of the male birds used at this Station in the 1927 and 1928 breeding operations are shown in table 63.

TABLE 63.—SUMMARY OF PROGENY RECORD OF COCKERELS, 1927-28

Wing band	Number of daughters at beginning	Number of daughters at end	Average egg record to Feb. 28	Average egg record 12 months	Average egg weight
					oz.
C 9940	3	2	69·65	258·64	23·96
K 373	2	1	47·5	196·00	22·20
K 545	27	20	43·35	189·96	25·45
K 10002	8	6	40·12	189·11	23·07
K 447	15	3	53·28	184·14	22·02
D 11761	6	6	53·99	180·96	21·59
K 346	3	2	21·6	180·50	23·37
J 103	9	8	38·21	174·21	24·34
J 726	5	4	21·4	172·72	25·21
K 371	17	10	41·39	171·49	24·24
K 297	24	14	38·07	169·52	24·38
J 132	11	9	27·55	158·17	23·80
D 11739	3	0	57·33	154·65	22·25
K 1123	14	11	41·48	157·81	24·48
K 84	10	8	35·1	154·33	26·10
K 466	19	12	43·62	152·15	24·84
K 389	5	1	37·4	144·3	21·6
J 26	1	1	15·00	141·00	25·02
K 655	5	1	20·8	134·21	25·57
K 345	10	5	25·1	124·57	23·80

TABLE 64.—PROGENY RECORD OF COCKERELS, 1928–29

Wing band	Leg band	Number of daughters at beginning	Number of daughters at end	Average egg record to Feb. 28	Average egg record to Oct. 31	Average egg weight
						oz.
L 817	L 8	3	3	58·0	219·31	22·79
D 11739	K 1	3	1	52·33	187·32	22·56
L 798	L 1	10	4	46·0	184·92	24·44
L 492	L 6	12	6	48·24	182·39	24·49
L 607	L 4	8	2	46·42	177·17	24·43
F 17020	C.N.P.R.A. G528	13	10	42·52	172·06	23·51
L 563	L 10	8	5	43·37	172·06	24·24
L 342		10	5	43·8	171·36	23·72
L 601		10	5	26·6	168·88	24·76
L 380	L 11	16	14	37·6	166·91	25·87
17003	L 14	29	14	43·07	163·75	23·95
L 595	L 9	5	1	18·8	156·8	23·95
F 17001	L 3	5	1	31·9	152·56	25·74
L 797	L 2	6	3	34·65	151·36	24·29
F 17027	L 13	16	5	31·30	141·71	25·11
K 371	C.N.P.R.A. G529	16	.....	35·99	141·05	23·52
476	C.N.P.R.A. 5	6	3	32·82	138·23	25·36
L 360	L 15	14	9	29·77	138·14	25·56
	L 16					

APIARY

The bees in the home apiary at this Station as well as in the out-apiaries conducted at Burton and Springhill, came through the winter of 1928-29 in good condition, and produced an excellent crop of high quality honey.

Experiments were carried on with different sizes of hives, different types of packing cases including the single, two-colony and four-colony cases, methods of queen rearing and swarm detection, package bees as a means of starting colonies, and methods of swarm control. Results of these experiments will be published from time to time, as sufficient data accumulates to warrant the drawing of conclusions.

EXTENSION AND PUBLICITY

During the year a special effort has been made to direct the attention of the public to the work of the Station. This has been accomplished in various ways:—

(1) Encouraging correspondence with farmers.
(2) Sending out circulars on timely topics.
(3) Endeavouring to see that Experimental Farm annual reports reach every farm home.
(4) Sending out bulletins to interested parties.
(5) Writing press articles on agricultural subjects.
(6) Attending and addressing farmers' meetings.
(7) Encouraging people (singly and in groups) to visit the Station and show them the experimental work in progress.

FARMERS' AND DAIRYMEN'S CONVENTION DELEGATES

Early in January upwards of two hundred and fifty delegates, attending the Farmers' and Dairymen's Convention in Fredericton, spent a full day at this Station. The program included an inspection of the live stock and

poultry, demonstrations in judging live stock and lectures on the feeding and care of live stock. The presence of Dr. J. H. Grisdale, Deputy Minister of Agriculture for Canada, who delivered an address, and Dr. Lionel Stevenson of the Ontario Department of Agriculture, who gave an interesting and instructive lecture and demonstration on parasites and their control, were special features of the day's program.

WOMEN'S INSTITUTE DELEGATES

The New Brunswick Women's Institute delegates (200 or more), attending their annual convention in Fredericton, paid their fourth annual visit to the Station. The ladies devoted most of their time to an inspection of the flower and vegetable gardens and the poultry plant. The officials were on hand to explain work under way and answer many and varied questions put to them by the delegates. Tea was served in the New Brunswick Agricultural School, followed by short addresses on "Insects and Their Control," "Beautifying Home Surroundings," etc.

CANADIAN WOMEN'S PRESS CLUB

In June of this year members of the Canadian Women's Press Club included this Station in their itinerary. The delegates (125 in number) were given every opportunity to study the experimental work, and they showed special interest in work with flowers, shrubs, vegetables and poultry. Those who were interested in rural problems, and especially those who were connected with the farm press, inquired into matters pertaining to live stock and field crops. Several articles written by members of the Club appeared in the press throughout Canada, commenting favourably on the work of this Station.

CONFERENCE OF FEDERAL AND PROVINCIAL AGRICULTURAL OFFICIALS

The first summer conference of federal and provincial agricultural officials was held at this Station during the month of August. A complete tour of the farm was made during the day and members of the staff outlined all the major projects. Lunch was served at noon and interesting addresses were delivered by Honourable Lewis Smith, Minister of Agriculture for New Brunswick, and Dr. W. J. Black, Director of Colonization, Agriculture and Natural Resources, Canadian National Railways, Montreal. It is hoped that federal and provincial officials will be able to meet annually at this Station.

ST. STEPHEN-MILLTOWN ROTARY CLUB ANNUAL VISIT

The St. Stephen-Milltown Rotary Club made its third annual visit to the Fredericton Experimental Station. In former years these Rotarians have been accompanied by a large number of farmers from Charlotte county, but this year they chose to bring over eighty farm women. While all the parties arranged by this Club have been successful, this one was unusually so. The party arrived at 10 a.m. and they were given an opportunity of inspecting every department of the Station. Demonstrations were also given in culling and judging poultry. A decided interest in the work of the Station was maintained throughout the day and it is doubtful if any other group of visitors ever left the Station with so much definite information and who showed a keener appreciation of what had been done for them by the Rotary Club and the Station staff. It is hoped that the St. Stephen-Milltown Rotary Club will continue their good work in the interests of agriculture.

POULTRY FIELD DAY

The eighth annual Poultry Field Day was held at this Station on August 21. Over two hundred farmers and their wives were present and showed a decided interest in the program prepared for them. Judging and culling demonstrations were featured in the forenoon and quite a number took part. The annual meetings of the New Brunswick Poultry Producers' Association and the New Brunswick Registered Poultry Breeders' Association were held during the day. Dr. Weaver's address on "Poultry Diseases and Parasites" was very much appreciated and was followed by an interesting discussion.

PETERSVILLE-ENNISKILLEN FARMERS' MEETING

The Petersville-Enniskillen Agricultural Society held its fourth annual meeting at this Station during the summer. The party was headed by Rev. Father Allen, who has played no small part in interesting the farmers of his district in better methods of farming. Agriculture has taken a decided change for the better in this district and we hope to see these annual visits continued. A few days later the boys and girls of this district, interested in Pig Club work, accompanied by others from Hoyt, came to the Station to receive instruction in swine judging. This party was under the direction of Mr. F. E. Baird, Agricultural Representative, Gagetown, N.B.

LIVE STOCK DAY

Another Live Stock day was held at this Station in September. Live stock breeders exhibiting at the Fredericton Exhibition were invited to this meeting. A number of addresses pertaining to the live stock industry were delivered and an inspection of the live stock and farm buildings formed part of the program. All the visitors were particularly interested in the pasture improvement work carried on at this Station.

NORMAL SCHOOL STUDENTS

The eighth annual visit to this Station was made by three hundred Normal school students.

The number of visitors to the Station during the year showed an increase over the previous years. Correspondence with farmers also showed a decided increase. This was particularly noticeable during the winter months. Members of the staff addressed a number of farmers' meetings and judged live stock at exhibitions.

The radio has proven an effective way of bringing attention of the public to the work of this Station. A series of weekly addresses by members of the Station staff were delivered over the air. The report of the Egg-Laying Contest and the Live Stock Market reports were broadcast each week and special announcements were made at intervals. A great many sales of live stock, poultry and farm produce were made through this channel. The number of radios in farm homes is increasing rapidly and it would seem as though this method of reaching the farmer will prove more and more effective as time goes on.

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