DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

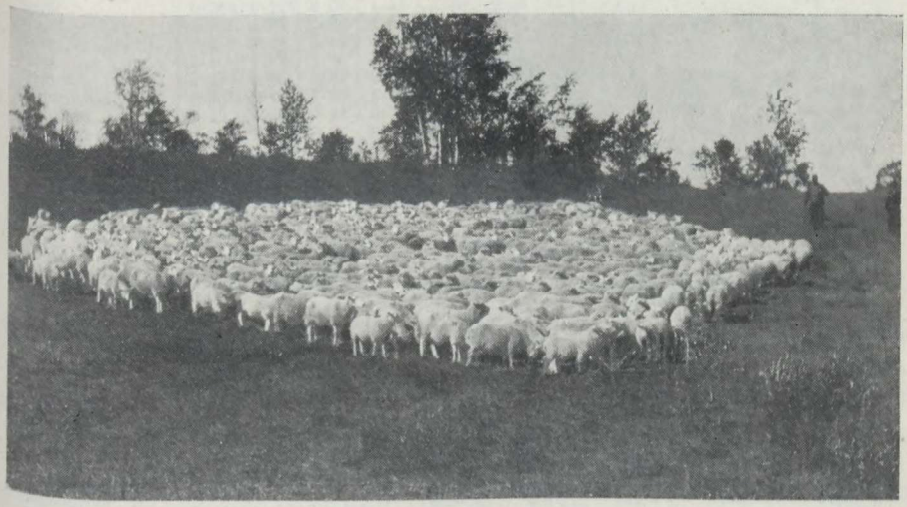
EXPERIMENTAL STATION

LACOMBE, ALBERTA

INTERIM REPORT OF THE SUPERINTENDENT

F. H. REED, B.S.A.

FOR THE YEAR ENDING MARCH 31, 1921



Sheep on Range, Experimental Station, Lacombe, Alberta.

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922

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DOMINION EXPERIMENTAL STATION, LACOMBE, ALBERTA

REFORT OF THE SUPERINTENDENT, F. H. REED, B.S.A.

Changes in personnel during the past two years have necessarily resulted in some interruption to experimental work at the Station, but, with returning normal labour conditions, new and more experiments will be undertaken; and the Station, by the introduction of new varieties of farm crops, by testing new methods of cultivation, and by trying new methods of breeding, feeding, and managing live stock, will continue to assist the farmers of Central Alberta in solving their farm problems.

SEASON

The year 1920 was the driest in the history of this farm, the total precipitation being but 12·415 inches, or 5·541 inches below that of the average of the twelve preceding years, which averaged 17·956 inches. The precipitation for the six growing months, April 1 to September 30, equalled 8·79 inches. This was considerably below the average amount for the period. Only 0·38 inches of rain fell in August, and the 1·56 inches of precipitation in September was too late to be of material benefit to the cereal crops.

MONTHLY AND YEARLY PRECIPITATION RECORD FOR THE YEARS 1908–1920, INCLUSIVE

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
January	0·2	0·72	0·73	0·55	0·76	0·93	1·45	0·295	0·4	0·75	5·3	0·21	1·34
February	0·97	0·3	0·59	0·48	0·20	1·15	1·0	0·025	1·38	0·52	0·06	0·818	0·40
March	1·06	0·345	0·33	1·01	0·13	0·81	0·8	0·075	0·52	0·33	0·30	0·77	0·905
April	0·269	0·275	0·04	1·15	1·26	0·15	0·34	0·32	0·60	1·24	4·6	2·30	2·23
May	2·912	2·63	1·73	1·51	2·92	0·48	1·285	1·245	2·043	3·262	0·94	3·14	1·62
June	8·215	2·24	3·87	5·62	3·00	2·98	6·07	8·485	3·570	1·49	1·47	1·029	1·495
July	2·1	4·28	1·35	4·39	5·29	3·43	1·11	3·37	4·311	1·13	1·24	2·321	1·52
August	2·37	0·91	2·61	2·63	4·44	2·435	1·10	0·84	5·218	1·885	3·93	1·635	0·38
September	0·305	0·43	1·00	2·50	1·27	0·59	2·36	1·833	3·055	2·043	1·125	2·33	1·56
October	0·40	1·05	0·24	0·62	1·56	0·68	0·30	0·533	0·4	1·363	0·015	0·64	0·715
November	0·0	0·37	0·51	0·78	0·93	0·05	1·5	0·3	1·013	0·0	1·20	1·18	0·01
December	0·25	0·82	0·30	0·19	0·08	0·07	0·98	0·0	0·4	1·3	0·725	0·62	0·24
Totals	19·041	14·370	13·30	21·43	21·84	13·755	18·295	17·321	22·91	15·313	20·905	16·993	12·415

METEOROLOGICAL RECORDS, 1920–1921

Month	Max.	Date	Min.	Date	Prec.	Sunshine
	°		°		Inch	Hours
April	50·8	27th	−24·1	2nd	2·23	100·3
May	71·8	7th	9·1	10th	1·61	217·8
June	89·3	31st	26·9	13th	1·495	264·5
July	90·7	17th	31·9	13th	1·52	354·3
August	92·1	13th	29·0	31st	0·38	263·7
September	86·5	4th	24·1	17th	1·56	202·0
October	78·2	1st	9·4	19th	0·715	155·1
November	59·5	2nd	−6·0	11th	0·01	94·1
December	45·6	4th	−30·1	22nd	0·24	84·5
January	50·0	13th	−24·1	31st	0·68	72·1
February	55·3	28th	−23·1	1st	0·42	99·8
March	54·8	17th	−28·1	13th	1·39	122·2
Yearly					12·25	2,030·4

ANIMAL HUSBANDRY

Lacombe being in the centre of one of the districts most suitable for live stock in the West, it is natural that the work of the Animal Husbandry Division should receive special attention. On this Farm at the present time there are 22 horses, including several pure-bred Clydesdale mares; 36 pure-bred Holstein and 20 grade Holstein cattle; 57 pure-bred and 9 grade Aberdeen-Angus cattle; 838 sheep, made up of a large number of crosses, as will be described; and 103 pigs, Berkshire, Yorkshire, and Duroc Jersey.

Unfortunately, due to the partial disorganization resulting from changes in the staff during the past several years and to vacancies of continued duration, it has been impossible to report the maximum of experimental work. It is hoped, however, to expand largely during the coming year.

BEEF CATTLE

The beef herd consists of 57 pure-bred and 9 grade Aberdeen-Angus cattle. The herd sire is Eliminator of Gwenmawr 3rd, 17474—a choicely bred Ballindalloch Blackbird, of outstanding breed type, and a most prepotent sire. There are a number of extra good females, and five animals, shown at the Calgary Summer Fair, 1920, won two first, one second, two fourth and two fifth prizes. Eliminator of Gwenmawr was Reserve Champion.

Several young bulls were sold during the year to head the herds of local breeders. These young bulls were all of good type, with plenty of size and breed character, and all have proved most satisfactory. There are, at present, several promising bull calves in the herd which will be sold as breeders as soon as they reach serviceable age.

All young heifers of desirable type are being kept in the herd to take the place of the older cows and those of inferior type, with the grades, are being weeded out; so that, in the near future, the herd will consist entirely of a superior type of pure-bred females which, when mated with the present herd bull, should produce offspring of excellent type, scale and quality.

The dry season of 1920 made it necessary to supplement the pasture with hay. Notwithstanding the season, the beef herd was in good condition when it came into winter quarters, and has made good gains during the mild winter. As it was necessary to supplement the shortage of pasture to carry the animals over, no record could be kept of the gains made by the young cattle on summer pasture.

Part of the herd was wintered out in the open; nine head of cows and two year-old heifers were kept in an open feed lot with bush for shelter and were fed on upland hay of good quality; eleven yearling heifers, one steer and four young bulls were wintered in corrals near the stable. These were fed hay and a small grain allowance consisting of oats and bran; and, in early spring, a small amount of oat and pea ensilage was added to their ration. The remainder of the herd was wintered in the stable, and fed hay, oat and pea ensilage and a small amount of chopped oats. The whole herd is in prime breeding condition (March 31) and all calves dropped during the year were healthy and vigorous.

COST OF WINTERING CATTLE IN THE OPEN

The nine head of Aberdeen-Angus cattle, which were fed in the open feed lot all winter, consumed an average of 20·6 pounds of upland hay per day for the period November 1 to April 30. This hay cost an average of $15 per ton, and would make the cost of carrying the cattle 15·45 cents per day, or $37.28 per head, for the six winter months.

FITTING BULLS FOR SALE

The pure-bred live stock industry is one of the most important branches of agriculture in Alberta. Some of the largest herds of pure-bred cattle in the world are located in this province. The sale of young bulls for heading breeding herds and for

grading up range stock brings in a large revenue each year. Many of the larger breeders fit their young bulls under semi-range conditions, only putting them in the stable, to stable-break them, for a short period.

As this Station fits a considerable number of bulls for sale each year, it was considered advisable to ascertain whether bulls of breeding age would make better gains tied up in the stable or running together in corrals. Four yearling Aberdeen-Angus bulls, that had been running in an open corral all winter, were used in the experiment. Two were tied with halters in a box-stall in the barn, and two were left together in the open corral. They were all fed for a month on a ration of alfalfa hay, pea and oat silage, oat chop, bran and oil cake, the object being to obtain maximum growth with home-grown feeds. The two bulls which were tied up made an average gain of 60 pounds per month over the average gain made by the bulls running together in the open.

When fitting young bulls of this age running loose in corrals, the trouble is that they get too much exercise. They are full of energy and very easily excited, and will seldom let each other rest. When tied up they do not run all their flesh off, but, after being fed, will lie down and chew their cuds. In this way all the digestible portion of their food is used in body building and not burned up in young bullish pranks.

The market the breeder is feeding for should determine the methods he follows in fitting his animals. The price obtained in the sale ring is often in proportion to the amount of flesh the animal is carrying, and a few extra pounds of finish often mean a substantial increase in the selling price. This is particularly true with high-class animals to head pure-bred herds, and these should certainly be fitted in the stable. Unfortunately, for use on many of our large ranges bulls of somewhat inferior type are still purchased. It may be that for this purpose the growing and fitting of young bulls entirely in the open is more suitable and more profitable.

DAIRY CATTLE

The dairy herd consists of 36 pure-bred and 20 grade Holstein-Friesian cattle. Among the pure-bred cows are several outstanding individuals, and these mated to the famous old sire, Prince Aaggie Mechthilde, 8482, have produced some most promising young heifers. During the year an extra good young bull, Ottawa Korndyke Keyes, 41184, was received from the Central Experimental Farm, Ottawa. This young bull bids fair to be a worthy successor to Prince Aaggie Mechthilde.

Owing to the extremely dry summer, the milking cows were never on good pasture and, from the middle of August, were fed dry prairie hay. Under these feed conditions it was impossible to produce high milk records. Six cows are now entered in the Record of Performance test, and promise to make a creditable showing.

As it has been found that young dairy stock will not stand the severe cold as well as young beef animals, all the Holsteins under eighteen months old were wintered in the stables. Because of lack of stable room the matured dry cows were wintered in the open with a poplar bluff shelter. They were fed only upland hay, and were brought in about a month before freshening. All wintered well and were in good condition at calving.

GRADING-UP EXPERIMENT WITH DAIRY CATTLE

A grading-up experiment with dairy cattle was inaugurated in 1913. The object of this experiment is to tabulate the increase in the milk flow resulting from crossing a pure-bred Holstein-Friesian bull from high-producing ancestry, on common grade cows, and on each succeeding generation; also to obtain reliable data to encourage the use of pure-bred sires.

This experiment will require a considerable number of years before its ultimate conclusion, as each animal should reach maturity before a definite comparison is drawn; furthermore, results are only obtained through the female progeny, and a cow may pass a number of lactation periods without dropping a heifer calf.

SUMMARY OF GRADING UP EXPERIMENT WITH DAIRY CATTLE USING A HIGH-PRODUCING SIRE ON COMMON GRADE AND GRADE HOLSTEIN COWS

Cow	Herd No.	Date of Freshening	No. of Lactation Period	Age at Commencement of Lactation Period	No. of days in Period	Yield of Milk for Period	Average Daily Yield for Period	Per cent. Butter Fat	Butter Fat for Period	Average Daily Butterfat
				Years Days		Lbs.	Lbs.		Lbs.	Lbs.
Common Grade	30	April 29, 1913	1	–	365	7,607·3	20·5	4·1	311·9	·84
		July 17, 1914	2	–	579	9,810·6	17·0	4·3	527·2	·73
		June 10, 1916	3	–	523	10,173·8	19·4	3·84	468·7	·89
Daughter	69	Mar. 22, 1920	2	3 285	245	5,226·8	21·3	4·18	201·5	·89
Common Grade	31	May 2, 1914	2	– –	383	4,988·8	13·0	3·6	179·5	·47
		Aug. 28, 1915	3	– –	368	6,380·7	17·3	3·8	243·6	·66
Daughter	72	May 7, 1919	1	2 139	313	7,591·8	24·2	3·6	275·0	·88
		June 14, 1920	2	3 26	237	6,974·6	29·4	3·6	250·13	1·06
Grade Holstein	19	Feb. 4, 1914	1	– –	457	8,276·1	18·1	3·4	281·3	·62
		Sept. 4, 1915	2	– –	386	7,668·9	19·9	3·47	266·6	·61
		Oct. 23, 1916	3	– –	327	7,241·1	22·1	3·3	236·1	·72
		Jan. 1, 1918	4	– –	330	6,544·8	19·8	3·3	216·3	·63
Daughter	54	Mar. 3, 1917	1	2 30	451	8,482·6	12·2	3·4	274·0	·61
Grade Holstein	17	Dec. 11, 1913	1	– –	569	10,201·2	18·0	4·4	448·8	·79
		Oct. 5, 1916	2	– –	354	6,825·8	19·3	4·0	273·5	·77
Daughter	41	April 20, 1916	1	2 139	324	7,725·0	23·8	3·6	266·2	·86
		May 4, 1917	2	3 153	225	6,414·2	28·5	3·28	210·4	·93
		April 5, 1918	3	4 123	441	9,562·8	21·7	3·3	320·4	·71
		Aug. 28, 1919	4	5 269	223	8,465·7	37·9	3·5	297·75	1·33

Granddaughter	*77*	*May 5, 1920*	*1*	*3*	*3*	*271*	*7,082·9*	*26·1*	*3·13*	*224·56*	*·86*
Grade Holstein	*20*	Mar. 17, 1914	*1*	–	–	*533*	13,528·2	25·3	3·7	625·06	·93
		Oct. 6, 1916	2	–	–	354	10,876·4	30·7	3·26	425·7	1·0
		Nov. 22, 1916	3	–	–	235	4,892·0	20·8	3·19	187·3	·66
		Nov. 17, 1917	4	–	–	358	6,687·6	18·7	3·12	332·4	·58
Daughter	47	Jan. 10, 1917	1	2	299	304	5,815·9	19·1	3·28	229·3	·63
Grade Holstein	13	Mar. 31, 1914	2	–	–	403	8,430·2	20·9	3·8	400·3	·79
		Sept. 3, 1915	3	–	–	352	5,542·2	15·7	3·69	245·6	·58
		Nov. 3, 1916	4	–	–	479	10,367·7	21·6	3·61	449·5	·78
Daughter	65	April 1, 1919	1	2	149	326	7,383·1	22·6	3·6	264·8	·81
		Mar. 15, 1920	2	3	132	291	7,875·7	27·1	3·1	256·12	·84
Grade Holstein	15	Dec. 22, 1913	1	–	–	517	11,997·6	23·2	3·9	584·8	·9
		Sept. 2, 1915	2	–	–	361	9,137·5	25·3	3·79	415·3	·96
		Sept. 7, 1916	3	–	–	310	5,500·0	17·7	3·92	258·6	·69
Daughter	42	April 9, 1916	1	2	110	346	9,110·2	26·3	3·4	369·8	·89
Daughter	43	Dec. 7, 1917	1	3	353	599	10,636·7	17·8	3·6	384·9	·64

The data obtained in the grading-up experiments are presented in the above table. The experiment has not progressed far enough for definite conclusions to be drawn from it, as in many cases only the first or second lactation records of the daughters have been obtained up to date. As the records of the grade dams were made as mature cows the daughters must attain maturity before complete comparisons can be made. However, it will be observed that even in the first periods of the daughters, the average daily yield of butter fat is higher than the largest average yields of the dams.

LACTATION RECORDS FOR THE YEAR ENDING MARCH 31, 1921

Name of Cow	Date of Freshening	No. of Days in Milk	Total lbs. of Milk for Period	Daily Average Yield of Milk	Average per cent fat in Milk	Lbs. of Fat for period	Amount of Meal eaten at 2c. per lb.	Amount of Roots and Ensilage eaten at $4 per ton	Amount of Hay eaten at $20 per ton	Amount of Green Feed eaten at $15 per ton	Amount of Straw eaten at $5 per ton	Months on Pasture at $1.50 per month	Total Cost of Feed for period	Months Official Record	Profit on Product
		Days	Lbs.	Lbs.	Percent	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	mos.	$ cts.	Lbs.	$ cts.
L.E.S. Evergreen Rosa	Dec. 27, 1919	396·5	10,238·0	25·8	3·34	343·26	3,971	9,586	3,036	2,700	40	3	153·79	307·15	153·26
May Echo Lady	Feb. 19, 1920	344	9,683·9	38·15	3·1	312·07	3,900	8,300	2,791	2,320	180	4	131·05	290·50	159·45
May Echo Lee	Dec. 18, 1919	282	7,484·5	26·6	3·3	242·64	2,795	6,620	1,750	2,700	0	3	105·65	224·59	118·94
L.E.S. Royalton Korndyke Star	Mar. 22, 1920	302	8,070·5	26·7	2·86	279·79	3,827	6,886	2,221	1,650	190	3	127·46	294·887	167·42
L.E.S. Korndyke Rosa Echo	Apr. 25, 1919	518	11,721·1	22·6	3·8	411·46	3,995	9,780	2,960	2,810	.....	8	126·53	232·12	105·59
L.E.S. Daisy Johanna	Dec. 17, 1919	361	7,737·7	21·4	3·85	294·45	3,161	8,956	2,541	2,700	100	3	125·80	232·13	106·33
L.E.S. Korndyke Rosa	July 30, 1919	301	5,823·7	19·4	3·6	207·55	2,060	7,660	2,330	2,550	.....	3	79·66	108·45	28·79
Lawncrest Rosa Echo	Jan. 10, 1920	374	9,394·5	25·1	3·3	305·8	3,616	8,432	2,491	2,550	160	3	138·24	281·82	143·58
Nina Gem Lutske	Feb. 5, 1920	289	7,548·9	26·1	3·32	250·28	2,966	5,506	2,411	2,010	70	4	114·18	226·47	112·29
Grade No. 39	Feb. 29, 1920	262	7,477·9	28·5	3·7	299·26	3,085	7,190	2,421	2,350	70	3	93·76	224·34	126·58
Grade No. 72	June 14, 1920	237	6,974·6	29·4	3·6	250·13	2,853	4,332	1,871	.....	180	3	89·39	208·65	119·26
Grade No. 77	May 5, 1920	271	7,082·9	26·1	3·13	224·56	2,831	5,182	1,851	600	210	3	95·00	212·50	117·50
Grade No. 63	Mar. 22, 1920	243	5,226·8	21·3	4·18	201·5	1,940	4,160	1,590	1,350	.....	3	76·64	156·80	80·16
Grade No. 103	Nov. 15, 1919	359	11,427·7	31·8	3·54	342·36	4,075	8,762	2,626	2,700	.....	3	138·06	317·53	179·47
Grade No. 65	Mar. 15, 1920	291	7,875·7	27·1	3·1	256·12	3,015	6,032	2,061	1,900	.....	3	112·02	236·26	124·24

The above records were completed in the fiscal year ending March 31, 1921, and the values used for estimating the profit and loss per cow are as follow:—

Milk	3c. per lb.
Meal	2c. "
Roots and ensilage	$ 4 00 per ton
Hay	20 00 "
Green feed	15 00 "
Straw	5 00 "
Pasture	1 50 "

As the lactation period of some of the cows started before March 31, 1920, the values of the previous year's report were used in figuring the profit and loss per cow for the period prior to the ending of the fiscal year March 31, 1920. In estimating the profit per cow no deduction is made for labour, but also no addition is made for the value of the calf, which in almost all cases would be much higher than the labour.

Lawncrest Rosa Echo (at right) and four generations of her descendants.

DAIRY MANUFACTURING

The comparative prices of cheese and butter fat for the table given below represent the actual price per pound received for the cheese, and the price per pound for butter fat paid by the local creamery. While it is doubtful if as favourable prices could be obtained for the cheese if cheese making were general throughout the province, the fact is made quite clear that cheese making for the local market is very profitable and worthy of considerable expansion.

Month	Amount milk for cheese	Cheese made	Milk for one pound cheese	Price of cheese per pound	Value of milk per cwt.	Per cent of fat in milk	No. of pounds butterfat	Price of butterfat per pound	Value of milk per cwt.	Profit per cwt. of milk for cheese over butter	Average profit for year per cwt. of milk for cheese over butter
	Lbs.	Lbs.	Lbs.	cts.	$ cts.	%	Lbs.	cts.	$ cts.	$ cts.	$ cts.
April	7,479	680¾	10·9	30	2 73	3·3	246·8	73½	2 42	0 31	
May	Dairy closed on account of smallpox.										
June	6,503	623	10·3	30	2 89	3·6	234·1	54	1 94	0 95	
July	8,618	823	10·4	30	2 86	3·6	310·24	54	1 94	0 92	
August	7,608	722½	10·5	30	2 82	3·3	251·06	54	1 78	1 04	
September	5,807	590	9·8	30	3 04	3·4	197·43	53½	1 81	1 23	
October	5,602	567	9·8	30	3 02	3·4	190·46	53½	1 81	1 21	
November	6,487	666	9·8	30	3 08	3·3	214·07	53	1 74	1 34	
December	5,244	523	10·0	30	2 99	3·2	167·80	47	1 50	1 49	
January	5,910	591¼	9·9	30	3 00	3·2	189·12	47	1 50	1 50	
February	6,396	571	11·2	30	2 68	2·9	185·48	47	1 36	1 32	
March	7,183	655¼	10·9	30	2 74	3·1	222·67	47	1 45	1 29	1 14
Total	72,837 pounds of milk were made into cheese. On this amount of milk cheesemaking showed a profit of $812.76 over buttermaking.										

HORSES

The horses at this Station number 22 head—5 pure-bred Clydesdale mares, 2 pure-bred Hackney mares, 8 grade Clydesdale mares, 3 grade Clydesdale geldings, 2 grade Hackney geldings, and 2 foals of 1920.

A number of the work-horses were wintered in the open on upland hay, and toward spring a light grain ration. The only shelter was a poplar and willow bluff on the west side of the feed racks. All of the horses were in good condition in the spring, but as the number of horses was frequently changed it was impossible to secure accurate records of the feed used.

SHEEP

There are, at present, 838 sheep at this Station, consisting of the following classes: 135 old original range ewes, 136 shearling wethers, 259 yearlings, 257 young breeding ewes, 34 cull ewes, and 17 rams.

These sheep are being used in a grading-up experiment which was commenced in 1917. The object is to compare the improvement in mutton and wool qualities resulting from the use of pure-bred Hampshire, Shropshire, Oxford, Cheviot, Corriedale, and Leicester rams on common range ewes and their progeny. During the summer the sheep are run on free range in the hills, in charge of a shepherd, and they are wintered in open corrals at the Station. Records are being made of all carrying charges and feed cost, relative grades and values of all mutton and wool sold, and number and thriftiness of lambs from the different breeds.

During the past winter the old ewes, cull ewes and shearling wethers have received a fattening ration of hay, oats and recleaned screenings, and will be marketed as soon as the wool clip is secured. Owing to scarcity of other feeds the breeding ewes were wintered on prairie hay only. Each sheep required an average of 3·4 pounds of hay a day for maintenance. They wintered well on the hay, but could have wintered more cheaply had the usual farm supply of roughage, such as good oat straw and green oat sheaves, been available to replace at least half of the hay.

The lambs were weighed after reaching winter quarters. As it is four days' trip from the summer range, they were given four days to settle down and regain their normal weight before being weighed.

COMPARISON OF THE WEIGHT OF THE LAMBS OF THE DIFFERENT BREEDS AS THEY CAME OFF THE SUMMER RANGE, 1920

Breed	No.	Total Weight	Average Weight
		lbs.	lbs.
Hampshires	39	2,580	66·2
Cheviots	37	2,300	66·2
Leicesters	34	2,060	60·6
Oxfords	40	2,420	60·5
Corriedales	25	1,440	57·6
Shropshires	84	4,750	56·3

The breeding ewes have been carried over the winter in good condition on upland hay, but will receive a small ration of oats before the lambing season.

WEIGHTS OF FIRST CROSS GRADE BREEDING EWES, MARCH, 1921

Breed	No. of Ewes	Weights	Average
		lbs.	lbs.
Hampshires	36	4,140	115·0
Leicesters	48	5,155	107·4
Oxfords	38	4,035	106·2
Corriedales	25	2.600	104·0
Cheviots	32	3,295	103·0
Shropshires	78	7,360	96·9

Five first cross grade shearling wethers of each breed were exhibited at the Edmonton Spring Fat Stock Show, and the different breeds were placed by the judge who placed the other sheep classes at the exhibition. The information obtained by having the wethers of the respective breeds placed by an unbiased expert judge was considered to be of value in checking up the value of the different breeds for crossing on common range stock for the production of fat wethers.

PLACING OF FINISHED SHEARLING WETHERS BY JUDGE AT EDMONTON SPRING FAT STOCK SHOW

Breed	Placing
Shropshires	First
Cheviots	Second
Oxfords	Third
Hampshires	Fourth
Corriedales	Fifth
Leicesters	Sixth

The fat wethers and original ewes shown at the Edmonton Spring Fat Stock Show were put through the packing plant of the Swift Packing Company, to obtain all information possible *re* the respective breeds. The dressed carcasses were judged by the Swift Company's dressed meat expert.

The placing of the wethers of the different breeds as dressed carcasses was somewhat different from the placing as live wethers, but the dressed carcass placing coincides much more closely with the dressing percentages.

REPORT OF DRESSED CARCASS COMPETITION WITH FIRST CROSS GRADE SHEARLING WETHERS IN GRADING UP EXPERIMENT

Placings	Breed	No.	Live Weight	Dressed Weight	Dressing Percentage
			lbs.	lbs.	Per cent
1	Cheviots	5	570	317	55·61
2	Leicesters	5	680	365	53·67
3	Shropshires	5	600	320	53·33
4	Oxfords	5	680	353	51·91
5	Corriedales	5	660	346	52·42
6	Hampshires	5	620	332	51·93
	Original Ewes	5	470	224	47·65

GRAIN VS. WHEAT SCREENINGS FOR FATTENING SHEEP

This experiment was started with the object of ascertaining the comparative feeding value of wheat screenings as compared with oats. One hundred and thirty-six wethers were being fitted for market, and as there was a possibility of the sheep not doing well on the screenings, only thirty-six were used in the lot. The oats used would grade No. 1 Western, and the screenings were an average run of elevator wheat screenings that had not been recleaned. In addition to the grain ration they received all the wild upland hay they could eat.

OATS vs. SCREENINGS

—	Lot 1 Oats	Lot 2 Wheat Screenings
Number of sheep in experiment	100	36
Number of days in experiment	23	23
Total weight at beginning of experiment—lbs	11,010·0	3,725·0
Total weight at end of experiment—lbs	11,280·0	4,020·0
Gain during period for lot—lbs	270·0	295·0
Gain per head during period—lbs	2·7	8·2
Gain per head per day—lbs	0·117	0·356
Amount of grain eaten per lot—lbs	2,875·0	1,656·0
Amount of grain eaten per sheep per day—lbs	1·25	2·0
Grain fed for each lb. gain—lbs	10·7	5·6

Prior to this experiment it was ascertained that upland hay alone constituted a maintenance ration, while the addition of grain converted it into a fattening ration. For that reason no record was kept of the hay fed; also, the results obtained from the grain fed should be a fair indication of their value.

SUMMARY OF RESULTS OF LAMBING SEASON, 1920

COMPARISON OF SHEARLING EWES WITH AGED EWES OVER FIVE YEARS OLD FOR LAMB PRODUCTION

—	No. Bred	Per cent. of Ewes Lambed	Per cent. of Lambs	Per cent. Singles	Per cent. Twins	Per cent. Died	
						Single	Twins
Old Ewes	225	76·88	82·66	86·02	4·37	4·37	15·8
Shearling Ewes	170	88·24	90·59	94·8	4·11	4·11	25·0

Conclusions

(1) The percentage of old ewes that conceived and gave birth to lambs in the spring is 11·36 below that of the shearling ewes.

(2) Allowing one lamb per ewe, the shearling ewes produced 7·93 per cent more than the old ewes.

(3 The shearling ewes did not produce as large a proportion of twin lambs.

(4) While the single lambs from the shearling ewes possessed stronger vitality than those from the old ewes, the twins from the old ewes possessed stronger vitality than those from the shearling ewes.

Sheep in Lane, Experimental Station, Lacombe, Alberta.

SWINE

In the fall of 1919, 57 cows were reserved for breeding purposes, 47 of which farrowed in the spring, giving birth to 436 pigs, of which 126 reached maturity. This low average of pigs raised per sow is due to a number of causes:—

(1) Of the 47 sows farrowing, only 16 were mature.

(2) Due to the unusually early freeze up in the fall of 1919, the cabins were frozen down in a low location before they could be moved and placed for spring farrowing. A large amount of snow fell during the winter of 1919-20 and owing to

a thaw at farrowing time it was impossible to keep the beds dry in the farrowing cabins.

(3) Over 50 per cent of the young pigs lost were hairless.

The percentage of hairless pigs was largest in the Berkshires and Durocs, and smallest in the Yorkshires.

At the time of writing this report, March 30, there are 7 boars, 4 old and 3 young, 47 sows and 49 feeders.

CLASSIFICATION OF BREEDING HOGS, MARCH 30, 1921

Breed	Boars		Sows	
	Old	Young	Old	Young
Berkshire	2	2	11	9
Duroc	–	1	5	9
Yorkshire	2	–	7	7

Considering the results of carrying last year's breeding sows over the winter, the meal ration has been cut down, and, up to the present, they have been kept in good thrifty condition on 4 pounds of meal per sow per day. This will have to be slightly increased before farrowing time.

EXPERIMENT TO COMPARE RAPE, ALFALFA AND OATS FOR PASTURE FOR HOGS

In this experiment 20 hogs were run on the rape and oat pasture and 36 were run on the alfalfa pasture.

They were fed all the chop—oats and barley mixed in equal proportions—that they would clean up nicely twice a day. They also received approximately five pounds of buttermilk per pig per day. They had free access to water and a mixture of coal, lime, sulphur and salt. In the three lots, pigs of the three breeds were practically equal in numbers.

HOG FEEDING EXPERIMENT

COMPARISON OF RAPE, ALFALFA AND OATS AS PASTURE CROP FOR HOGS

—		Oats	Alfalfa	Rape
Number of hogs in experiment		20	36	20
Initial weight, gross	lbs.	1,314·0	2,113·2	1,100·0
" " average	"	65·7	58·7	55·0
Finished weight, gross	"	3,550·0	6·598·8	3,425·0
" " average	"	177·5	183·3	171·25
Number of days in experiment		92·0	92·0	92·0
Total gain for period	lbs.	2,236·0	4,485·6	2,325·0
Average gain per animal	"	118·8	121·7	116·25
" daily gain per animal	"	1·28	1·32	1·26
Amount of meal eaten by group for period	"	11,580·0	18,216·0	10,762·0
" buttermilk " "	"	9,200·0	16,560·0	9,200·0
" meal eaten per pound gain	"	5·18	4·06	4·62
" buttermilk " "	"	4·11	3·69	3·96
Total cost of feed	$	221·05	351·90	206·73
Cost of feed per head	"	11·05	10·05	10·33
" " per day	c.	12·01	10·9	11·2
Cost to produce 1 lb. gain	"	9·8	7·8	8·8
Cost of feeds— Buttermilk at 20 cents per cwt. Meal at $35 per ton.				

Summary

This experiment shows alfalfa pasture to make the most economical gains, and oat pasture to be the least economical. The fact that the oat pastured hogs made gains at a cost of 2 cents per pound greater than the alfalfa pastured hogs may be due in part to the fact that the oat pasture dried up before the alfalfa or rape, and that these hogs also consumed more meal. It is noteworthy that, while the rape pastured hogs made one cent a pound cheaper gains than the oat pastured hogs, these latter averaged ·02 pounds higher daily gains, due, no doubt, in part at least, to the greater consumption of meal.

EXPERIMENT TO COMPARE THE MERITS OF THE SELF-FEEDER WITH HAND-FEEDING

In this experiment 15 hogs were fed their chop dry in a self-feeder, and 20 hogs were fed their meal in the form of a slop by hand as a check lot. They received as much as they would clean up nicely twice a day. The meal ration in both cases consisted of oats and barley mixed in equal proportions. Each pig received approximately five pounds of buttermilk per day. They all pastured on oats, and had access to a mixture of coal, lime, sulphur and salt. They also received all the water they would drink.

HOG FEEDING EXPERIMENT

SELF-FEEDER VS. HAND FEEDING

——		Self Fed	Hand Fed
Number of hogs in group		15	20
Initial weight, gross	lbs.	795·0	1,314 0
" " average	"	53·0	65·7
Finished weight, gross	"	2,493·0	3,550·0
" " average	"	166·2	177·5
Number of days in experiment		92·0	92·0
Total gain for period	lbs.	1,698·0	2,236·0
Average gain per animal	"	113·2	111·8
" daily gain per animal	"	1·23	1·215
Amount of meal eaten by group for period	"	6,323·4	11,580·0
" meal eaten per pound gain	"	3·72	5·17
" buttermilk eaten by group for period	"	6,900·0	9,200·0
" " " per pound gain	"	4·06	4·11
Total cost of feed	$	124·45	221·05
Cost of feed per head	"	8·29	11·05
" " " per day	c.	9·01	12·01
Cost to produce 1 pound gain	"	7·3	9·4
Cost of feeds— Buttermilk at 20 cents per cwt. Meal at $35 per ton.			

This experiment shows the hogs that were fed on the self-feeder to produce gains at a cost of 2·1 cents less per pound gain than the trough-fed hogs, and their daily gains were also slightly greater. It was observed that the self-fed hogs showed greater uniformity, probably because of the fact that each of the hogs of the self-fed lot consumed all the meal they desired, while the more aggressive and vigorous individuals of the trough-fed hogs consumed a major portion of the ration at the expense of the weaker hogs. For feeding market hogs, there seems to be no question that the self-feeder is best, but for feeding pure-bred breeding animals, the hand feeding gives the feeder very much more opportunity to study the individuality of his hogs and to select the best. Even more important, the hand-fed sows are much more accustomed to being handled and will usually prove much quieter mothers.

EXPERIMENT TO COMPARE THE EFFICIENCY OF BERKSHIRES, YORKSHIRES AND DUROC-JERSEYS AS ECONOMICAL PORK PRODUCERS

In this experiment 12 uniform, thrifty pigs of each breed were selected for the test. They all pastured on alfalfa, and received approximately five pounds of buttermilk per pig per day, in addition to all the water they would drink. The meal, consisting of ground barley and oats in equal proportions, was fed in the form of a slop, twice a day.

SWINE FEEDING EXPERIMENT

COMPARISON OF BERKSHIRES, DUROC-JERSEYS AND YORKSHIRES ON THE BASIS OF ECONOMY OF PORK PRODUCTION

——		Berks.	Durocs.	Yorks.
Number of hogs in groups		12	12	12
Initial weight, gross	lbs.	552·0	762·0	798·0
" " average	"	46·0	63·5	66·5
Finished weight, gross	"	1,956·0	2,340·0	2,315·2
" " average	"	163·0	195·0	192·1
Number of days in experiment		92·0	92·0	92·0
Total gain for period	lbs.	1,404·0	1,578·0	1,507·2
Average gain per animal for period	"	117·0	131·5	125·6
" daily gain per animal	"	1·28	1·43	1·36
Amount of meal eaten by group	"	4,795·2	6·369·6	7·050·0
" " " per pound gain	"	3·41	4·03	4·61
" buttermilk eaten by group	"	5,500·0	5·500·0	5,500·0
" " " per pound gain	"	3·91	3·48	3·62
Total cost of feed	$	94·95	122·50	134·41
Cost of feed per head	"	7·91	10·20	11·11
" " " per day	c.	8·6	11·08	12·07
Cost to produce 1 pound gain	"	6·7	7·7	8·8
Cost of feeds— Buttermilk at 20 cents per cwt. Meal at $35 per ton.				

Summary

The Berkshires made the most and the Yorkshires the least economical gains. The Durocs made the largest daily gain.

This experiment has been conducted for five years at this Station. During 1916 and 1917 the Yorkshires made the most economical gains, while the Berkshires have led in 1918, 1919, and 1920. The results presented in this table represent only one year's experiment, and do not prove the superiority of one breed over another.

In considering the results of this experiment considerable allowance must be made for differences of strain and individuality within the breeds. The Yorkshires are a much more active hog than either of the other breeds, and took much more exercise when fed on pastures, and under different feeding conditions results might be quite different. Too definite conclusions cannot be drawn from this experiment as to the relative merits of the other breeds. This experiment has demonstrated the importance of good breeding stock. It is considered that the larger gains of one breed over the other are due more to the superiority of certain individuals within the breed than to the superiority of one breed over the other.

COMPARISON OF THE PROLIFICACY AND THE COMPARATIVE EFFICIENCY OF YORKSHIRE, BERKSHIRE, AND DUROC-JERSEY AS BROOD SOWS AS SHOWN BY THEIR 1920 SPRING FARROWING RECORD

There were 20 Berkshire, 14 Yorkshire, and 9 Duroc-Jersey sows which produced spring litters in 1920. The following table presents all the available data.

	Yorkshires	Berkshires	Duroc-Jerseys
Number of sows farrowed	14	20	9
Total number of young pigs	143	174	92
Average " " per sow	10·2	8·7	10·2
Total " " dead at birth	12	50	35
Average " " " " per sow	0·86	2·5	3·9
Total " " smothered	26	51	32
Average " " " per sow	1·9	2·55	3·58
Total " " died	17	.....	3
Average " " " per sow	1·2	.....	0·33
Total " " raised	57	71	22
Average " " " per sow	4·07	3·55	2·47

The table includes the litters of both the gilts and the mature sows, which can be further classified as follows:—

Yorkshires	4	mature sows and	10	gilts.
Berkshires	10	" "	10	"
Duroc-Jerseys	6	" "	3	"

There were no hairless pigs among the Yorkshires, two litters among the Berkshires, and one litter among the Duroc-Jerseys, while one Duroc-Jersey sow ate all her litter during the night, and no record as to this litter is at hand.

The apparent causes for the low average of pigs raised per sow are outlined at the beginning of the section of this report dealing with swine.

FIELD HUSBANDRY

Under this Division are given the yields of field crops at the Station for the crop year of 1920, the results of experimental work with ensilage crops, the results secured in the endeavour to determine the most suitable and profitable crop rotation for this district, and information on methods of cultivation likely to give best results in preparation of the soil for crop production and for the conservation of soil moisture and soil fertility.

CROP YIELDS, 1920

When the exceptionally dry year is considered, good yields of grain were obtained on the main farm fields. Victory oats yielded 75·4 bushels of grain per acre, while barley yielded 38·86 bushels of grain per acre. The pasture, hay crop, and the mixture of peas and oats for silage were all seriously affected by the dry season. The amount of pasture obtained from cultivated pastures was light, and on the upland pastures of native grasses the amount of growth was almost negligible. Timothy yielded 1,751 pounds of hay per acre, which was below the average. Peas and oats for ensilage produced only 5·64 tons per acre green weight.

ENSILAGE CROPS

Oats alone, or a mixture of peas and oats grown for silage has been substituted for the hoed crop of corn and roots in later years. Peas and oats is a thoroughly practical crop and provides silage that is highly nutritious. It is more economically produced than roots and is much safer than corn, since there is no area where its culture can be questioned because of unsuitability to climatic conditions.

If handled properly, a crop of green feed will clean the land better than a summer-fallow or hoed crop that is not kept perfectly clean. Two or three crops of weeds can be destroyed before the crop for ensilage is sown about June 1. The tillage necessary to destroy these weeds leaves the seed bed for the silage crop in excellent condition. If good seed is used it makes a strong germination and chokes out nearly all the weeds which may germinate with it. Any that may grow are cut and put into the silo with the crop before their seeds ripen. As the crop is cut early and removed immediately, the land can be given early fall cultivation as a preparation for the succeeding crop.

Sunflowers are gaining pepularity as a silage crop. They produce a larger tonnage per acre than either corn or peas and oats. The quality of the silage produced appears to be superior to that produced from immature corn, and compares favourably with the best pea and oat silage. It is doubtful if sunflowers will ever take the place of corn in districts where the best varieties of ensilage corn can be matured, but up to date there is every indication that in this district, sunflowers will be substituted for corn as a silage crop. Oats, or peas and oats, cut green and fed as green feed, make excellent winter fodder as well as silage, but sunflowers can be used for winter feeding only as silage. The sunflowers produce a larger tonnage per acre, and allow inter-tillage for weed control. Hence if sunflowers are grown for silage, and oats, or peas and oats, for green fodder they will provide two excellent cleaning crops and a varied and abundant supply of winter feeds.

CROP ROTATIONS

In order to be in a position to supply farmers with information concerning crop rotations most suitable for Central Alberta, an experiment was started with different crop rotations in 1914. The system of growing grain exclusively, which has been in general practice throughout the West and which served very well in pioneer days, does not result in permanent and profitable agriculture, but in a multiplicity of soil problems.

When planning the following rotations, the fact was kept in mind that the Lacombe Experimental Station is located in what is mainly a mixed farming district.

The following are the rotations which are being compared at this Station:—

ROTATION "L" OR MAIN FARM ROTATION

First year.—Hay.

Second year.—Pasture. Manure, 12 tons per acre.

Third year.—Pasture. Broken in July six inches deep and cultivated for balance of season.

Fourth year.—Oats, or oats and peas for silage.

Fifth year.—Oats.

Sixth year.—Barley seeded down with different grass mixtures.

This rotation covers about 240 acres of land, and has a distinct advantage for localities where the rainfall is such that the summer-fallow results in too great a growth of straw the following year. The fall cultivation given the summer-

ploughed sod is sufficient to produce an excellent crop without carrying so much fertility and moisture that lodging becomes a serious consideration.

The application of unrotted barnyard manure on the sod has not given as good results as expected. It was thought that during the rainy season the weed seeds contained in the manure would germinate but fail to develop for the reason that the manure soon dries out and the young plants are destroyed. The last three years have been very dry, and all weed seeds have not germinated. The result has been that the number of weeds has increased from this practice. Only manure which has been piled so that it will heat enough to destroy all weed seeds will be used in this rotation in the future.

While the use of cultivated grasses for pasture has increased the stock-carrying capacity of cultivated land over wild land, there appears to be no doubt that an annual pasture mixture of a combination of the cereals will produce larger yields of a more succulent pasture, and it might possibly be a more economical method of handling the summer pasture problem in localities where open range is not available.

Another place where this rotation might be criticized is in the crop that precedes the year in which seeding down to grass is done. This is the main oat crop. It might be advisable to have the main oat crop follow the breaking, and the crop of green feed precede the barley to be seeded down. The spring and fall cultivation necessary when the oats, or peas and oats, are used as a silage and cleaning crop would put the seed-bed in better condition to receive the grass seed.

ROTATION "K"

First year.—Hoed crop.
Second year.—Wheat.
Third year.—Barley seeded down.
Fourth year.—Hay. Manure, 12 tons per acre.
Fifth year.—Pasture.
Sixth year.—Pasture.

This rotation might be objected to for the reason that it has too much of the land in hoed crop; however, with the introduction of sunflowers for silage and the use of oats, or peas and oats, for green feed, the land devoted to hoed crops might be utilized for the production of these crops. Part of the hoed crop area, also, could be summer-fallowed if desired.

This rotation might be improved by substituting an annual pasture crop for the second pasture year.

ROTATION "O"

First year.—Hoed crop.
Second year.—Wheat.
Third year.—Oats.
Fourth year.—Summer-fallow.
Fifth year.—Barley, seeded down.
Sixth year.—Hay.
Seventh year.—Pasture.

This rotation is better than "L" in one respect: the crop in which the seeding down is done follows the summer-fallow, but in a year with a reasonable amount of moisture the crop usually lodges. However, the last four years have been quite dry, and the yields on summer-fallow land have been much higher and more profitable than on stubble land. Moreover, summer-fallow is ready in the spring, and no delay results in seeding. As it stands, rotation "O" might be objectionable because one-seventh of the land is in hoed crop and one-seventh in summer-fallow, and only three

years out of the seven produce cash crops. For a mixed farm rotation a crop of green feed might be substituted for the summer-fallow.

ROTATION "C"

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

This rotation is for a straight grain farm, and has demonstrated that such a rotation is not a durable one for this district. Although summer-fallowed thoroughly every third year, the weeds have been merely held in check, and the root fibre in the soil has become rapidly depleted, with consequent danger of soil drifting. However, notwithstanding this, it must be said that on this rotation the yield from the crop following the summer-fallow has been 35·5 bushels for an average of eight years, excluding one year's results in which the crop was injured by frost. The second wheat crop after summer-fallow averaged 19·8 bushels over the same period, but it should be stated that for the last few years the yield has been very low, due to damage by weeds.

The ultimate test of these different rotations is the average profit per acre they will yield and still leave the land in good condition, free from weeds and with fertility well maintained.

The following is the profit per acre for the different rotations in 1920:—

Rotation	Average Profit per Acre
"L"	$6 65
"O"	6 23
"K"	3 23
"C"	2 67

In summing up these rotations it might be well to point out that there is no best rotation for all farms and localities. Each individual farm has its own peculiar conditions. The soil, the degree of weed infestation, the distance from market, the amount of rainfall, and the ability and experience of the farmer, will all vary. For these reasons the above rotations as presented should be taken only as a guide to help farmers in working out rotations suitable to their own peculiar conditions.

Records of all items of cost of production have been kept, also the value of the crop produced each year that the rotations have been in operation. A fixed set of values was used prior to 1919, but in 1919 and 1920 prices were so much higher than those which were in use that it was considered advisable to use values which were more in keeping with the prevailing prices.

VALUES USED IN FIGURING 1920 ROTATION RESULTS

—	Cost Price	Selling Price
Rent and manure	$ 4 00 per acre	
Wheat seed	3 00 per bush.	$1 50 crop
Barley seed	1 50 "	65 "
Oat seed	1 00 "	45 "
Potato seed	2 00 "	1 00 "
Timothy seed	18 00 per cwt.	
Alfalfa seed	75 00 "	
Rye grass seed	20 00 "	
Red clover seed	40 00 "	
Alsike clover seed	40 00 "	
Machinery	60 per acre	
Labour	40 per hour	
Horse labour	10 "	
Twine	10 00 per cwt.	
Threshing—		
Oats	08 per bush.	
Barley	10 "	
Wheat	12 "	
Kerosene	40 per gallon	
Gear Oil	1 25 "	
Hay	20 00 per ton	20 00
Green feed, or silage crops	.....	4 00
Roots	.....	4 00
Straw	.....	5 00
Pasture for one month	.....	2 00

ROTATION MAIN FARM OR "L"

Field	Crop	Area	Rent and Manure	Seed Twine and Use of Machinery	Value of Manual Labour	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for one Acre	Cost for 1 Bush	Cost for one Ton	Grain	Straw	Hay	Total Value	Value of Crop per Acre.	Profit or Loss per Acre.
		ac.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	bush.	tons	tons	$ c.	$ c.	$ c.
D	Hay	35·40	141 60	108 54	74 00	87 00	.....	411 14	11 61	.....	13 26	.....	....	31	620 00	17 51	5 90
C	Pasture	31·57	126 28	18 94	.....	.....	.....	145 22	4 60	.....	.....	.....	....	.....	154 00	4 88	0 28
B	Pasture	39·16	156 64	23 50	.....	.....	.....	180 14	4 60	.....	.....	.....	....	.....	151 47	3 86	−0 74
A	Green feed	29·69	118 76	194 31	52 00	219 60	.....	584 67	19 68	.....	3 49	.....	....	167·33	669 32	22 51	2 83
F	Oats	37·81	151 24	196 59	23 60	343 00	228 00	942 43	24 93	33 01	.....	2,850	61	.....	1,587 59	41 98	17 05
E	Barley	41·97	167 88	205 68	17 00	204 00	159 00	753 56	17 95	47 01	.....	1,590	57	.....	1,322 40	31 53	14 58

ROTATION "K"

Rotation Year	Crop	Area	Rent and Manure	Seed, Twine and Use of Machinery	Value of Manual Labour	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for one Acre	Cost for one Bushel	Cost for one Ton	Grain	Straw	Hay	Total Value	Value of Crop per Acre	Profit or Loss per Acre
		ac.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Lbs.	Lbs.	Lbs.	$ c.	$ c.	$ c.
1	Hoed crop	3·56	14 24	62 49	80 68	86 71	.....	244 12	68 57	.....	.....	Green feed 270·90 Potatoes 7,820 Roots 12,626			209 76	58 92	9 65
2	Wheat	3·50	14 00	27 70	2 80	18 10	10 92	73 50	21 00	80 08	.....	54·70	99·10	.....	161 25	46 07	25 07
3	Barley	3·41	13 64	17 40	1 40	18 90	8 22	59 56	17 47	72 04	.....	39·48	29·18	.....	56 57	16 59	0 88
4	Hay	3·53	14 12	33 71	2 32	4 20	.....	54 35	15 40	.....	.....	.....	.....	3,100	31 00	8 72	6 68
5	Pasture	3·63	14 52	2 18	2 40	4 02	.....	23 12	6 37	.....	.....	.....	.....	2,970	40 90	11 27	4 90
6	Pasture	3·6	14 40	2 16	.....	4 20	.....	20 76	5 77	.....	.....	.....	.....	2,150	45 00	12 40	6 65

ROTATION "O"

Rotation Year	Crop	Area	Rent and Manure	Seed Twine and Use of Machinery	Value of Manual Labour	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bus.	Cost for 1 Ton	Grain Lbs.	Straw Lbs.	Hay Lbs.	Hoed Crop Lbs	Total Value	Value of Crop per Acre	Profit or Loss per Acre
		ac.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.					$ c.	$ c.	$ c.
1	Hoed Crop	2·42	9·68	3·20	40·80	33·00	.....	86·68	35·82	.....	3·25	.....	.....	.....	50,370	101·14	42·21	6·39
2	Wheat	2·42	9·68	17·32	2·40	12·00	8·84	50·24	20·75	68·2	.....	4,420	6,940	.....	.....	127·84	52·82	32·07
3	Oats	2·42	9·68	8·82	1·60	10·65	8·52	39·27	16·23	36·8	.....	3,620	5,315	.....	.....	66·50	27·48	11·25
4	Summer-fallow	2·42	9·68	1·45	.....	11·92	.....	23·05	9·52	.....	.....	.....	.....	.....	.....	.....	.....	−9·25
5	Barley	2·42	9·68	9·45	1·20	8·76	5·42	57·56	23·78	80·5	.....	3,250	6,740	.....	.....	67·63	27·95	4·17
6	Hay	2·42	9·68	20·25	2·28	3·72	.....	35·93	14·85	.....	19·51	.....	.....	3,680	.....	36·80	15·21	·36
7	Pasture	2·42	9·68	.....	.....	.....	.....	9·68	4·00	.....	.....	.....	.....	.....	.....	6·40	2·64	−1·36

ROTATION "C"

Rotation Year	Crop	Area	Rent and Manure	Seed Twine and use of Machinery	Value of Manual Labour	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bushel	Grain Lbs.	Straw Lbs.	Total Value	Value of Crop per Acre	Profit or Loss per Acre
		ac.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.		$ c.			$ c.	$ c.	$ c.
1	Summer-fallow	1	4·00	60	.....	4·80	.....	9·40	.....	.....	.....	.....	.....	.....	−9·40
2	Wheat	1	4·00	5·34	·70	3·42	2·72	16·24	.....	1·13	1,360	2,470	40·30	.....	14·66
3	Wheat	1	4·00	5·34	·60	1·52	0·80	11·66	.....	1·73	405	1,680	14·37	.....	2·75

CULTURAL EXPERIMENTS

The investigational work reported below was started in 1911, with the object of obtaining some information as to methods of cultivation likely to give best results in preparing the soil for crop production and for the conservation or increase of soil moisture and soil fertility. These cultural experiments consist of fourteen separate projects, and utilize 454 plots.

DEPTH OF PLOUGHING SUMMER-FALLOW

These tables show the result of the depth of ploughing summer-fallow in a three-year rotation as follows:—

First year.—Summer-fallow.

Second year.—Wheat with manure applied at the rate of six tons per acre in early autumn and the stubble ploughed late in September.

Third year.—Oats with land disced after harvest.

DEPTH OF PLOUGHING SUMMER-FALLOW FOR WHEAT

Plot No.	Method of Ploughing	7-Year Average Yield of Grain per Acre		7-Year Average Yield of Straw per Acre	
		Bush.	Lbs.	Tons	Lbs.
1	Ploughing 3 inches deep	40	34	2	509
2	Ploughing 4 inches deep	39	33	1	1,981
3	Ploughing 5 inches deep	38	36	2	73
4	Ploughing 6 inches deep	39	57	2	717
5	Ploughing 7 inches deep	42	7	2	804
6	Ploughing 8 inches deep	42	56	2	1,018
7	Ploughing 5 inches deep, subsoiled 4 inches deep	42	30	2	1,364
8	Ploughing 6 inches deep, subsoiled 4 inches deep	44	11	2	1,103
9	Ploughing 7 inches deep, subsoiled 4 inches deep	43	26	2	1,371
10	Ploughing 8 inches deep, subsoiled 4 inches deep	44	59	2	1,255

DEPTH OF PLOUGHING WHEAT STUBBLE FOR OATS

(These plots were ploughed the fallow year at various depths for the wheat crop. See previous table for yields.)

Plot No.	Method of Ploughing	8-Year Average Yield of Grain per Acre		8-Year Average Yield of Straw per Acre	
		Bush.	Lbs.	Tons	Lbs.
1	Ploughed 3 inches deep	58	24	1	1,319
2	Ploughed 4 inches deep	57	9	1	898
3	Ploughed 5 inches deep	59	16	1	1,433
4	Ploughed 5 inches deep	61	25	1	1,501
5	Ploughed 5 inches deep	59	26	1	1,473
6	Ploughed 5 inches deep	66	15	1	1,521
7	Ploughed 5 inches deep	64	14	1	1,675
8	Ploughed 5 inches deep	66	15	1	1,381
9	Ploughed 5 inches deep	62	28	1	1,539
10	Ploughed 5 inches deep	65	20	1	1,663

It would appear from the data obtained that the depth of ploughing the summer-fallow influences both the yield of wheat and, to some extent, the yield of the oat crop the following year. Judging from observations made in the crop in the field, and from the data obtained, the results indicate that six inches deep is the optimum depth at which to plough summer-fallow.

While subsoiling has a tendency to increase the yield of wheat, it does not cause any appreciable increase in the yield of oats the following year.

As subsoiling requires considerable extra horse-power, there is no doubt that any increase in yield obtained does not justify the added expense of the operation; furthermore, the soil which has been subsoiled seems to lose its fertility and tilth more quickly than soil which has been ploughed only; however, certain types of heavier soil may be benefited by occasionally subsoiling to break up the hard pan that may form at plough depth.

DEPTH OF PLOUGHING SOD

This experiment was started with the object of ascertaining the most suitable depth at which to plough sod in the district where a four-year rotation, such as the one following, is used:—

First year.—Hay. Top dressed with manure in the autumn at the rate of 8 tons per acre.

Second year.—Hay. Ploughed as soon as possible after hay is harvested and top worked for the remainder of the season to insure rotting of the sod.

Third year.—Wheat. The stubble ploughed either in the autumn or the following spring.

Fourth year.—Oats. Seeded down with a suitable hay mixture.

THIRD YEAR OF ROTATION

DEPTH OF PLOUGHING SOD TO BE SEEDED TO WHEAT

Plot No.	Method of Ploughing	8-Year Average Yield of Grain per Acre		8-Year Average Yield of Straw per Acre	
		Bush.	Lbs.	Tons	Lbs.
1	Ploughed 3 inches deep	34	13	1	1,723
2	Ploughed 4 inches deep	38	13	2	148
3	Ploughed 5 inches deep	39	16	1	1,549
4	Ploughed 3 inches deep	34	14	1	1,674

FOURTH YEAR OF ROTATION

PLOUGHING WHEAT STUBBLE FOR OATS

Plot No.	Method of Ploughing	8-Year Average Yield of Grain per Acre		8-Year Average Yield of Straw per Acre	
		Bush.	Lbs.	Tons	Lbs.
1	Ploughed 3 inches deep	63	4	1	1,506
2	Ploughed 4 inches deep	63	24	1	966
3	Ploughed 5 inches deep	62	13	1	1,642
4	Ploughed 6 inches deep	57	33	1	1,503

In this experiment the four-inch ploughing shows a decided increase in yield per acre over the sod ploughed three inches deep, while the sod ploughed five inches deep shows an increase of only one bushel and three pounds per acre over the sod ploughed four inches deep. This would indicate that sod in this district should be ploughed at least four inches deep; also that there is very little advantage in ploughing more than four inches deep.

The results obtained in ploughing wheat stubble at different depths seem to indicate that, for such a rotation, there is no benefit in ploughing stubble for oats deeper than four inches.

While four inches in depth is quite sufficient to give maximum yields when the ploughing is carefully done and every furrow is four inches deep, nevertheless, under ordinary conditions it is necessary to set the plough somewhat deeper in order that the ploughing may be thoroughly done.

SUMMER-FALLOW TREATMENT

In this experiment a three-year rotation, as follows, was used:—

First year.—Summer-fallow. Ploughed as early in June as possible.

Second year.—Wheat. Manure applied on the stubble at the rate of six tons per acre and ploughed under six inches deep in autumn.

Third year.—Oats. No autumn cultivation.

The different methods of summer-fallow treatment used are outlined in the following table.

SUMMER FALLOW TREATMENT

Plot No.	Method	7-year Average Yield of Grain per acre		7-year Average Yield of Straw per acre	
		Bush.	Lbs.	Tons	Lbs.
1	Ploughed 4 inches in June, packed and cultivated as necessary	39	46	2	737
2	Ploughed 6 inches in June, packed and cultivated as necessary	40	1	2	730
3	Ploughed 8 inches in June, packed and cultivated as necessary	39	17	2	540
4	Ploughed 4 inches in June, cultivated and ploughed 4 inches in Sept., harrowed	34	17	2	5,602
5	Ploughed 6 inches in June, cultivated and ploughed 4 inches in Sept., harrowed	30	19	2	295
6	Ploughed 8 inches in June, cultivated and ploughed 4 inches in Sept., harrowed	30	31	2	318
7	Ploughed 6 inches in June, cultivated and ploughed 4 inches in Sept., harrowed	32	39	2	155
8	Ploughed 4 inches in June, cultivated and ploughed 6 inches in Sept., harrowed	33	6	1	169
9	Ploughed 4 inches as early as possible in June, cultivated, ploughed 6 inches in Sept., and left untouched	37	17	2	437
10	Ploughed 5 inches in June, seeded to rape and pastured off	32	37	1	1,716
11	Ploughed 6 inches May 15th, packed, harrowed, and cultivated as necessary	43	1	2	299
12	Ploughed 6 inches June 15th, packed, harrowed, and cultivated as necessary	39	6	2	408
13	Ploughed 6 inches July 15th, packed, harrowed, and cultivated as necessary	37	30	2	241
14	Fall cultivate before summerfallowing, ploughed 6 inches in June, harrowed, packed and cultivated as necessary	44	21	2	922
15	Fall ploughed 4 inches before summerfallowing, ploughed 6 inches in June, harrowed, packed, and cultivated as necessary	46	16	1	736
16	Ploughed 6 inches in June, packed, cultivated as necessary	41	54	2	966
17	Ploughed 6 inches in June, no packing and cultivated as necessary	41	27	2	519

The results from plots 1, 2 and 3 would indicate that about six inches is the proper depth to plough summer-fallow when it is to be ploughed only once and later kept cultivated. The results from plots 1 to 9 show that the yield is decreased by a second ploughing of the summer-fallow. A second ploughing may at times be necessary to kill weeds, but if the fallow is to be ploughed twice, the first ploughing should be early and shallow, with the second ploughing done when necessary, but as early in the summer as possible and about two inches deeper than the first ploughing. Although on plot 10 the yield of wheat was slightly heavier than on plots 5, 6 and 7, the land became badly infested with weeds and, except where the precipitation is abundant, the growing of a pasture crop on fallow land is not to be recommended. Plots 11, 12 and 13 indicate the decided advantage of early ploughing of the summer-fallow. The fallow should be ploughed as early after spring seeding as possible. This is the best time for storing moisture and for killing weeds. Quite the heaviest yields were secured from plots 14 and 15 by fall cultivating and fall ploughing the land to be summer-fallowed. It is doubtful if the increase secured in plot 15 by fall ploughing compensated for the extra cost of ploughing over discing as was done on plot 14. The best practice is to follow the binder with the disc at cutting time, and, if possible, disc again before freeze up. Plough the fallow six inches deep immediately after seeding the following spring and keep cultivated to prevent growth of weeds. This will kill the most weeds, store and conserve the most moisture and produce the heaviest yields.

STUBBLE TREATMENT

In this experiment a three-year rotation was used, as follows:—

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat or oats.

WHEAT STUBBLE TREATMENT FOR WHEAT

Plot No.	Treatment	7-year Average Yield of Grain per Acre		7-year Average Yield of Straw per Acre	
		Bush.	Lbs.	Tons	Lbs.
1	Ploughed in autumn	24	6	1	857
2	Disc harrow in autumn	17	43	1	268
3	Stubble burned, disc in autumn	18	43	1	448
4	Stubble burned, plough in autumn	21	17	1	409
5	Stubble burned spring, seed at once	18	36	1	50
6	Plough in spring, seed at once	19	29	1	431
7	Disc at cutting time, spring plough	18	47	1	359
8	Disc at cutting time, autumn plough	21	30	1	424
9	Plough in autumn, subsurface packed at once	23	20	1	724
10	Plough in spring, seed, subsurface pack	21	21	1	593

WHEAT STUBBLE TREATMENT FOR OATS

Plot No.	Treatment	7-year Average Yield of Grain per acre		7-year Average Yield of Straw per acre	
		Bush.	Lbs.	Tons	Lbs.
11	Plough 5 inches in autumn, subsurface pack as necessary	64	3	1	1,004
12	Plough 5 inches in spring, seed, subsurface and pack	63	12	1	1,783
13	Cultivate autumn, plough 5 inches in spring, seed	63	8	1	1,211

This experiment indicates that, in this district, fall ploughing produces larger yields of wheat than does spring ploughing, while, for oats, the results are practically

equal. This being the case, and because it greatly relieves the pressure of spring work, it is advisable to plough in the fall all land intended for spring seeding.

Burning the stubble, whether in spring or fall, while it has slightly increased the yield, cannot be recommended, as it will materially assist in depleting the organic matter in the soil and will eventually result in soil drifting.

SEEDING TO GRASSES AND CLOVERS

This experiment was planned to learn what method of seeding grasses and clovers would be most successful in obtaining a good "catch," a high yield of hay, and, what is equally important, the largest total profit from the use of the land. A hay mixture of 10 pounds western rye and 10 pounds red clover was seeded in different methods and at various places in a number of five-year rotations.

SEEDING TO GRASSES AND CLOVERS

Plot No.	Rotation Year					
	1st Year	2nd Year		3rd Year	4th Year	5th Year
	Treatment	Method of seeding grasses and clovers	9-year Average Yield of Grain	8-year Average Yield of 1st year Hay	7-year Average Yield of 2nd year Hay	6-year Average Yield of 3rd year Hay
			Bush. Lbs.	Tons Lbs.	Tons Lbs.	Tons Lbs.
1	Summer-fallow...	Seeded with wheat	38 38	1 1,628	1 1,730	1 1,733
2	Summer-fallow...	Seeded alone.....	— —	3 125	2 920	2 627
3	Hoed crop.....	Seeded with wheat	35 56	1 1,320	1 1,350	2 927
4	Hoed crop.....	Seeded alone.....	— —	2 850	2 3	2 307
5	Wheat.....	Seeded with wheat	30 36	1 1,250	1 1,435	Summer-fallow
6	Wheat.....	Seeded alone.....	— —	2 520	2 65	Summer-fallow
7	Wheat.....	Seeded with oats.	58 3	1 1,657	1 1,865	Summer-fallow
8	Wheat.....	Seeded alone.....	— —	2 830	2 995	Summer-fallow
9	Wheat manured 8 tons per acre on stubble.	Seeded with wheat	21 58	2 354	Summer-fallow	Wheat
10	Oats.....	Seeded alone.....	— —	2 320	Summer-fallow	Wheat
11	Wheat.....	Seeded with wheat	25 38	1 898	1 1,709	Hoed crop.

In this experiment, the plots seeded without a nurse crop yielded approximately twice as much hay as those seeded with a nurse crop. However, it is considered advisable to use a nurse crop at this Station, as the extra tonnage of hay obtained by seeding without the nurse crop does not compensate for the loss of the grain crop.

On the farm proper at this Station, it has been found advisable to use barley as the nurse crop for seeding down to grasses and clovers. This crop makes its growth in a shorter period than other cereals, thus leaving the young grass or clover plants a greater length of time in the fall to develop a vigorous growth to carry them through the winter.

Both grass seed and clover seed require a fine, firm, moist seed bed in good tilth and free from weeds. This condition of the soil can best be obtained by using either a summer-fallow or hoed crop; although, in a good year, with plenty of moisture, very good catches have been obtained on stubble land.

In a stock farm rotation the most logical place to seed down would be after an intertilled crop, such as corn, sunflowers, roots, or greenfeed for silage where the crop is removed early and the land given some fall cultivation.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS

In this experiment a five-year rotation was followed. The plots were all seeded down and two crops of hay removed. During the fourth year different methods of breaking were practised. This land was seeded with barley the fifth year.

Plot No.	Treatment 4th year	Average Yields			
		Year 4		Year 5	
		Hay Lbs.		Bush.	Lbs.
1	Plough 5 inches July 20 to 30, pack and disc at once, disc in autumn	2,520		34	45
2	Plough 5 inches October, pack, disc and harrow	2,330		22	27
3	Plough 3 inches early July, top work, back-set September, cultivate as necessary	2,110		37	1
4	Stiff tooth rip in July, plough 5 inches in September, cultivate as necessary	2,120		26	22
		Grain bush.	lbs.		
5	Plough 5 inches in spring—sown to wheat	17	12	23	10
6	Stiff tooth rip in July, plough 5 inches in September, cultivate as necessary—sown to flax	9	29	21	9
7	Plough 5 inches in spring—sown to peas	11	31	22	38
8	Plough May 15. Work as summer-fallow	No crop.		46	41

Larger yields have been produced on the sod broken early and summer-fallowed than on sod given any other treatment. However, the increase in yield resulting from this practice would not compensate for the loss of the hay crop.

Ploughing immediately after the hay is removed and keeping well tilled for the balance of the season would seem to be a more profitable system to adopt, and is the one practised in the main farm rotation at this Station. The sod, while not as well rotted as when ploughed earlier in the season, is in good condition to receive the crop and supply the plant food necessary for good growth the following season.

Ploughing in the spring and seeding with a cereal crop the same season is not as profitable as producing a crop of hay on the land and then breaking. In a normal year when spring breaking is cropped, the growing crop utilizes all the available moisture and the sod does not rot to any appreciable extent; hence, when the land is again ploughed, the unrotted sod is turned up to the surface, which is not the proper condition to insure a sufficient supply of plant food and a poor crop is certain because of the lack of moisture and available plant food.

While ploughing twice would not be profitable in ordinary farm practice, it might be necessary in some cases where grasses which are hard to eradicate, such as brome or couch grass, are growing in the land.

EFFECT OF APPLYING BARNYARD MANURE ON ROOTS AND THE SUBSEQUENT CROPS

In this experiment a three-year rotation was followed:—

First year.—Hoed crop.

Second year.—Wheat.

Third year.—Wheat or summer-fallow.

The object of this experiment is to obtain data *re* the time to apply, how to apply, and whether to use well rotted or green manure on the root crop, and the effect of the manure applied for roots on the subsequent crops.

EFFECT OF APPLYING BARNYARD MANURE ON ROOTS AND THE SUBSEQUENT CROPS

Plot No.	Treatment	1st Year, Roots		2nd Year, Wheat		3rd Year, Wheat and Summer-fallow	
		Tons	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	No manure, second year stubble ploughed in autumn	5	475	25	46	12	33
2	Manure applied on autumn ploughed 2nd year stubble, worked in at once	8	1,750	33	32	17	41
3	Manure applied in spring on autumn ploughed 2nd year stubble, worked in at once	9	1,755	38	6	27	4
4	Manure applied in autumn on second year stubble, ploughed under in autumn	11	955	42	11	29	43
5	Manure applied in spring on second year stubble, ploughed under in spring	11	1,975	41	15	28	42
6	Manure applied in winter on second year stubble, ploughed under in spring	10	1,380	37	15	25	50
7	Green manure applied in winter on second year stubble, ploughed under in spring	10	1,030	32	14	23	44
8	Green manure applied in winter, summer-fallow, disced in	13	1,187	40	57	Summer-fallow	
9	Summer-fallow	11	1,410	37	5	Summer-fallow	

In this experiment well rotted manure, applied at the rate of 12 tons per acre, was used except where otherwise stated.

The experiment would indicate that the best method of applying manure for the hoed crop is to apply well rotted manure on the stubble, either in the autumn or spring, and plough it under as soon as possible; while the poorest method of handling manure to obtain high yields of both roots and grain after roots is to apply it green in the winter and plough it under in the spring.

The whole experiment indicates that manure applied in any form is beneficial, but that best results are obtained when well rotted manure is used and either ploughed under or worked into the soil as soon as possible after it is applied.

APPLYING BARNYARD MANURE FOR WHEAT, BARLEY AND OATS

In this experiment a three-year rotation as follows was used:—

First year.—Summer-fallow.

Second year.—Wheat, oats or barley.

Third year.—Wheat, oats or barley.

Note.—In all cases an application of 12 tons of well rotted barnyard manure per acre was applied unless otherwise stated.

APPLYING BARNYARD MANURE FOR WHEAT, BARLEY AND OATS

Plot No.	Treatment	Nine-year Average					
		Wheat		Barley		Oats	
		1st year	2nd year	1st year	2nd year	1st year	2nd year
		Bus. lbs.	Bus. lbs.	Bus. lbs.	Bus. lbs.	Bus. lbs.	Bus. lbs.
1	Green manure applied in winter on 1st year stubble and disced in	38 16	20 39	51 16	41 15	75 21	70 26
2	Green manure applied in winter on summer-fallow and disced in	41 33	24 30	47 20	52 10	83 29	59 18
3	Grain sown on first year stubble, top dressed with spreader	37 43	21 50	48 24	35 12	74 31	74 13
4	Grain grown on summer-fallow, top dressed with spreader	41 —	23 16	45 13	50 3	88 8	56 12
5	No manure, first year stubble, ploughed in autumn	37 29	21 19	47 35	29 14	71 16	63 5
6	Manure applied on first year's stubble, ploughed under in autumn	40 7	26 27	47 10	38 36	77 32	71 33
7	Manure applied on first year stubble, ploughed under in the spring	39 7	26 44	51 38	38 37	77 26	70 29
8	No manure, first year stubble disced in autumn	35 57	18 4	51 10	28 12	96 8	59 30
9	No manure, burn first year stubble in autumn and plough	36 0	20 18	48 20	31 13	76 25	72 21

In presenting the data of this experiment, both the first and second year yields of the different crops are given. While in most cases the manure was applied with the second crop after summer-fallowing, the experiment would indicate that the manurial treatment affects the land for the full rotation period.

There appears to be no difference in the yields of grain from fall and spring applications of manure when it is ploughed down as soon as applied, and the increase in yields resulting from its application seems large enough to justify the cost of placing it on the land.

Judging from the results obtained in this experiment, it is advisable to use rotted manure in preference to green manure, not only because of the increased yields but because of the danger of introducing noxious weed seeds into the land through the application of green manure. Green manure should always be piled and allowed to heat and become thoroughly decomposed before being placed on the land.

Top dressing after the grain is up from two to six inches cannot be recommended except where soil drifting is a problem. Top dressing, at this stage, appar-

ently gives the young plants a temporary set-back for which the added plant food does not compensate.

The first year after the stubble is burned there is an increase in yield resulting from this practice; but the soil which has not had the stubble burned produces heavier yields after summer-fallowing, thus making the average results of these two practices approximately the same. When the loss of organic matter in the soil, resulting from burning the stubble, is considered, and when there is no appreciable increase in the yield as a result, the practice of burning the stubble after harvest cannot be recommended.

In districts where the rainfall is light much injury may be done if manure is applied in large quantities and not properly spread. There is not sufficient moisture to cause the manure to rot and the soil will be kept open and dry out badly. "Chunks" of manure under the furrow prevent the rise of subsoil moisture and one or even two crops may be seriously damaged. On the other hand, well rotted manure applied in light coatings and evenly spread will give profitable returns in any district. Manure spreaders do good work, but if the manure is carefully spread by hand and later harrowed it should be in good shape for ploughing under. The best time to apply would be in the fall on a first crop stubble after summer-fallow which is to be fall ploughed for a second crop. This will give better results than applying on fallow, as the cultivation of the fallow renders an abundance of plant food readily available, and if manure is added at this time there is danger of lodging, rust and frost injury.

GREEN MANURE

In this experiment a three-year rotation was followed. Green manuring or the ploughing down of a green growing crop and the application of 12 tons of well rotted barnyard manure on summer-fallow are compared with the bare fallow as a treatment for the grain crop.

MANURING COMPARISON

Plot No.	Treatment First Year	Second Year, Wheat 8-year Average		Third Year, Oats. 9-year Average	
		Bush.	Lbs.	Bush.	Lbs.
1	Summer-fallow	43	46	68	15
2	2 bushels of Golden Vine peas per acre (or similar variety) ploughed under in early July	40	52	63	22
3	2 bushels of Golden Vine peas per acre, ploughed under when in bloom	41	4	68	16
4	1 bushel of tares per acre, ploughed under in late July	42	17	65	59
5	Barnyard manure applied at rate of 12 tons per acre on summer-fallow	46	2	73	9
6	Summer-fallow	40	35	58	9

In this experiment the application of well-rotted manure at the rate of 12 tons per acre produces a yield of several bushels per acre more than either the bare fallow or green manuring in both the first and second crop after fallow. The ploughing under of the green manure decreases both the first and second-year crops. This is no doubt due to the manure holding up the furrow slice and keeping the ground loose and open, with a consequent heavy loss of moisture.

In summing up these experiments with manure it must be borne in mind this is a comparatively new farm, and there is still an abundance of fertility in the soil.

Moisture is the chief limiting factor, and the addition of manure increases the moisture-holding capacity of the soil. If the application of manure has, over an average of nine years' crops, given profitable results under our present new land conditions, it will certainly give much more profitable results on older land. On almost any land, under almost any conditions, well-rotted manure, if carefully spread and immediately ploughed under, can be applied with decided profit.

SOIL PACKERS

This experiment was started with the object of obtaining information on the best type of packer; the most opportune time to pack and the value of the packer. A three-year rotation, as follows, was used: first year, summer-fallow; second year, wheat; third year, wheat.

SOIL PACKERS

Plot No.	Treatment Given	7-Year Average Yield per Acre	
		Bush.	Lbs.
1	No packing	31	28
2	Packed with surface packer after seeding	25	4
3	Packed with surface packer after seeding, harrowed after packing	26	56
4	Packed with subsurface packer after seeding	25	31
5	Packed with subsurface packer after seeding, harrowed after packing	26	30
6	Packed with combination packer after seeding	27	40
7	Packed with combination packer after seeding, harrowed after packing	28	33
8	Packed with surface packer before and after seeding	28	14
9	Packed with subsurface packer before and after seeding	28	47
10	Packed with combination packer before and after seeding	27	40
11	Packed with surface packer before seeding	28	30
12	Packed with subsurface packer before seeding	28	1
13	Packed with combination packer before seeding	30	40
14	No packing	31	19
15	Packed with surface packer immediately after ploughing summer-fallow	30	41
16	Packed with subsurface packer after ploughing summer-fallow	30	51
17	Packed with combination packer after ploughing summer-fallow	32	10
18	Packed with surface packer after ploughing summer-fallow and again in spring after seeding	33	50
19	Packed with subsurface packer after ploughing summer-fallow and again in spring after seeding	35	10
20	Packed with combination packer after ploughing summer-fallow and again in spring after seeding	34	3
21	No packing	33	26
22	No packing, harrowed when grain is six inches high	33	23
23	Packed with surface packer when grain is six inches high	36	9
24	Rolled with smooth roller when grain is six inches high	36	44
25	No packing	39	24

PACKING ON SPRING PLOUGHED STUBBLE LAND

Plot No.	Treatment Given	7-Year Average Yield of Wheat	
		Bush.	Lqs.
1	Packed with subsurface packer before seeding	21	51
2	Packed with surface packer before seeding	21	31
3	Packed with combination packer before seeding	20	4
4	Packed with subsurface packer before seeding and after seeding	18	5
5	Packed with surface packer before and after seeding	21	0
6	Packed with combination packer before and after seeding	21	23
7	No packing	21	23
8	Packed with surface packer after seeding	21	9
9	Packed with subsurface packer after seeding	20	48
10	Packed with combination packer after seeding	21	14
11	No packing	20	1
12	No packing	19	46
13	Packed with subsurface packer in the fall	21	9
14	Packed with subsurface packer in the spring before seeding	22	0
15	Packed with subsurface packer in the spring after seeding	20	27
16	Packed with surface packer in the fall	18	1
17	Packed with surface packer in the spring before seeding	19	45
18	Packed with surface packer in the spring after seeding	17	48
19	Packed with combination packer in the fall	21	13
20	Packed with combination packer in the spring before seeding	19	31
21	Packed with combination packer in the spring after seeding	19	57
22	No packing	19	57
23	Packed with surface packer in the fall and in the spring after seeding	20	57
24	Packed with subsurface packer in the fall and in the spring after seeding	22	42
25	Packed with combination packer in the fall and in the spring after seeding	21	10

When the question of experimental error is considered the data obtained in this experiment do not give any definite results either for or against the packer. Without doubt the value of the soil packer was greatly exaggerated at the time of its introduction, and, from the data obtained, it is questionable if the packer will pay for the initial outlay of capital and the cost of operation.

The most valuable use of the packer is on freshly ploughed stubble land in light open soils, particularly if there is a heavy stubble, or on breaking or stiff sod where the furrow will not turn over flat. The packer will in these cases press the furrow down and renew the connection with the moist bottom of the furrow, thus hastening decomposition of the sods. But almost every farmer has a disc, and a double discing will do this packing quite as well, and at the same time prepare a seed bed. The claim is often made that the use of the packer stores and conserves moisture, but, with very few exceptions, this is not the case. The real work of the packer is to render moisture more quickly available, and the advantage from this is often of

short duration. If land is packed after seeding, the moist soil is pressed closely around the seed and the grain often comes up several days earlier than when a packer is not used. This advantage is much more apparent than real, and the result is seldom apparent at harvest time. In short, the conclusion would be: if you have a packer, use it; but if not the money can probably be invested elsewhere to much greater advantage.

DEPTH OF SEEDING

In this experiment, seeding at a depth of one, two, three and four inches with wheat and oats was compared.

Depth of Seeding	8-year average Yield of Wheat		9-year average Yield of Oats	
	Bush.	Lbs.	Bush.	Lbs.
Seeded 1 inch deep	41	40	70	0
Seeded 2 inches deep	46	15	73	16
Seeded 3 inches deep	45	36	72	2
Seeded 4 inches deep	48	16	74	11

There appears to be a slight advantage resulting from the deeper seeding, but there seems to be no specific depth at which maximum yields are produced. The point to bear in mind is that moisture is necessary for germination, and that the seed must be placed deep enough to reach moist soil. Heat and air are also necessary for germination, and if seed is placed too deep in cold, wet soil it will mould before germinating. The proper depth for seeding depends on the nature of the season and the condition of the soil, but as a rule the optimum depth will be a little below the moisture line at the time of seeding. Probably more seed has been wasted by too deep seeding than by too shallow seeding, and from two to three inches would, under average conditions, be about the right depth.

It will be found that in loose stubble land the moisture line is usually considerably deeper than in a compact summer-fallow. This is particularly true toward the end of seeding, and as seeding progresses the drill may be set to run deeper in stubble land.

CEREALS

The year 1920 was the driest in the history of this farm, the total precipitation being less than twelve and a half inches, which is fully five and a half below the average of the twelve preceding years. The precipitation for the six growing months, April to September, inclusive, was eight and three-quarter inches, considerably less than the usual amount received during that period.

Considering the exceptionally small rainfall, the yields of grain were good, although pastures were poor. Upland pastures of native grass yielded almost nothing.

PLOT TESTS OF CEREALS

The usual plot tests of varieties of cereals were carried on, all kinds being sown in duplicate plots of one-fortieth of an acre, except in a very few cases where the supply of seed was insufficient for two plots.

In the tables below, the varieties are mentioned in alphabetical order. Considering the variations from season to season in the results of plot tests, it is not desirable to attach a very great deal of importance to the results of any one season.

SPRING WHEAT

The plots of spring wheat were sown on May 12, and the total number of varieties was twenty-three. Of these, only nine are named sorts, the others being unnamed varieties from Ottawa which are at present undergoing preliminary tests.

SPRING WHEAT: TEST OF VARIETIES

Name of Variety	Date of Ripening	Number of Days Maturing	Average length of Straw including Head	Strength of Straw on a Scale of 10 points	Average Length of Head	Yield of Grain per Acre	Weight per Measured Bushel after Cleaning
			Inches		Inches	Pounds	Pounds
Bishop	Aug. 26	106	39	10	3·0	2,660	63·0
Bobs	" 23	103	34	10	3·0	2,130	64·1
Early Red Fife	" 28	108	36	10	3·2	2,260	64·2
Huron	" 28	108	36	10	3·5	2,770	64·2
Kitchener	" 31	112	40	10	3·0	3,080	64·3
Marquis	" 31	112	39	10	3·2	2,780	65·4
Prelude	" 17	97	38	10	3·0	2,320	65·2
Red Bobs	" 29	109	36	10	3·2	3,060	64·9
Ruby	" 22	102	37	9	3·2	2,500	65·0

Of the named varieties which have been grown for nine years, Bishop and Huron have given the largest yield, about 54 bushels to the acre. Bobs has given about 52 bushels and Marquis about 48.

Red Bobs wheat has been grown for three years, and has produced an average yield of 50 bushels 13 pounds per acre, while Marquis for the same period produced an average of 52 bushels per acre. For the last two years Kitchener has produced an average yield of 46 bushels per acre, and Early Red Fife an average yield of 45 bushels 50 pounds per acre, while Marquis has produced an average of 53 bushels 20 pounds per acre.

Red Bobs has matured from two to three days earlier, and Early Red Fife one day earlier, than Marquis, while Kitchener has always reached maturity on the same date as Marquis.

OATS

The oat plots were sown on May 15. There were ten varieties, nine of them being named sorts.

OATS: TEST OF VARIETIES

Name of Variety	Date of Ripening	Number of Days Maturing	Average length of Straw including Head	Strength of Straw on a Scale of 10 points	Average Length of Head	Yield of Grain per Acre	Weight per Measured Bushel after Cleaning
			Inches		Inches	Pounds	Pounds
Banner	Aug. 23	100	32	10	7·0	2,350	42·4
Daubeney	" 13	90	25	10	5·5	1,425	39·0
Gold Rain	" 23	100	32	10	7·0	2,190	46·0
Irish Victor	" 30	107	32	10	8·0	2,500	43·1
Leader	" 30	107	30	10	8·0	2,405	41·0
Liberty	" 11	88	28	10	6·0	1,180	51·1
Ligowo	" 23	100	31	10	6·0	2,150	44·8
Tartar King	" 23	100	29	10	8·0	1,575	42·8
Victory	" 25	102	30	10	7·0	2,190	44·0

Considering the results of the last ten years, we find that Banner has been the most productive variety, producing, on an average, nearly 108 bushels to the acre, while Victory has given nearly 105. The Leader oats have been grown for the past two years, and have averaged 83 bushels 28 pounds per acre. This variety required 113 days to mature, as against 110 for Banner. The Liberty hulless oat has been grown for three years and has given an average yield of 29 bushels 33 pounds per acre. In comparing this yield with other varieties, allowance should be made for the hull which the others possess. The Liberty oat matures slightly earlier than most of the other sorts.

BARLEY

Twenty varieties of barley were sown on May 12. Of these twelve were named sorts.

Name of Variety	Date of Ripening	Number of Days Maturing	Average length of Straw, including Head	Strength of Straw on a Scale of 10 points	Average Length of Head	Yield of Grain per Acre	Weight per Measured Bushel after Cleaning
			Inches		Inches	Pounds	Pounds
Albert	Aug. 8	88	36	8	2·7	1,990	48·5
Bark's Excelsior	" 28	108	32	10	2·0	3,140	49·0
Duckbill	" 28	108	34	10	3·5	2,040	54·0
Early Chevalier	" 13	93	41	7	4·0	2,100	53·5
Gold	" 21	101	31	9	3·5	2,880	55·0
Guymalaye	" 12	92	31	9	2·5	2,360	61·8
Manchurian	" 15	95	38	9	4·0	2,320	51·8
O.A.C. No. 21	" 15	95	44	8	3·5	3,360	51·5
Odessa	" 15	95	42	9	4·0	2,580	52·3
Stella	" 23	103	42	9	4·2	2,480	52·8
Success	" 9	89	42	9	3·2	2,300	54·1
Trebi	" 14	94	32	7	2·5	4,100	50·5

Taking the average of the past ten years, the O.A.C. No. 21 variety has given the largest yield among the varieties which have been grown for the full period, viz., over 68 bushels to the acre. Among the varieties grown for shorter periods, special mention should be made of Bark's Excelsior, which in a four-year average has yielded over 84 bushels to the acre, surpassing every other sort. This variety is, however, very much later in ripening than most others. It ripens about 11 days after O.A.C. No. 21.

PEAS

Seven varieties of field peas were sown on May 14. Four of these were named sorts.

PEAS: TEST OF VARIETIES

Name of Variety	Date of Ripening	Number of Days Maturing	Average Length of Straw	Average Length of Pod	Yield of Grain per Acre	Weight per measured bushel after cleaning
			Inches	Inches	Lbs.	Lbs.
Arthur	August 25	103	49	2·2	1,960	65·2
Baugalia	" 17	95	44	2·2	1,980	65·9
Golden Vine	" 23	101	46	2·0	1,980	66·0
Solo	" 17	95	47	2·5	1,400	63·2

Taking the average of eleven years, the Arthur variety has ripened three days before the Golden Vine, and has yielded half a bushel less to the acre. The Arthur has given almost exactly 26 bushels to the acre.

FORAGE CROPS

ENSILAGE CROPS

Eight varieties of corn for ensilage were sown in duplicate 1/132 acre plots on May 29. These plots were harvested September 1, and gave the following yields per acre:—

	Source	Tons	Lbs.
1. Compton's Early	Ottawa	19	412
2. Yellow Flint (Twitchell's Pride)	"	17	1,772
3. Yellow Flint (McConnell's)	"	17	1,112
4. Improved Leaming	"	17	716
5. Longfellow	"	15	1,416
6. Wisconsin No. 7	"	12	1,344
7. White Cap Yellow Dent	"	12	552
8. North Western Dent	Mackenzie	11	1,364
Average		15	1,086

Sunflowers which had been grown at this Station for the first time in 1919 were again under test, an area of 1½ acres being set aside for this work. This area was divided into four plots, and sunflowers were sown in at different distances between rows. All plots were cut September 15, when seed was in the early milk stage. Yields per acre for the different seedings are given in the following table:—

In rows—	Yield per acre	
24 inches apart	14 tons	200 lb.
30 " "	15 "	.....
36 " "	14 "	400 lb.
42 " "	11 "	600 "
Average	13 tons	1,300 lb.

FIELD ROOTS

Variety tests with Swede turnips, mangels and field carrots were conducted, the varieties tested being the principal ones on sale locally, and a few varieties the seed of which was raised on the Experimental Farms. All varieties were grown in duplicate 1/132 acre plots and careful records of yields taken at harvest.

SWEDE TURNIPS

Twenty varieties were sown May 29 and harvested October 5 and 6; the following yields being obtained:—

TEST OF TURNIP VARIETIES

Variety	Source	First Plot Yield per Acre		Second Plot Yield per Acre		Average Yield per Acre	
		Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
1. Ditmar's	Exp. Station (Kentville)	19	16	15	360	17	188
2. Prize Purple Top	Wm. Rennie	16	1,132	13	796	14	1,964
3. Selected Westbury	Steele Briggs	14	908	15	360	14	1,634
4. Champion	Exp. Station, Charlottetown	14	70	13	664	13	1,367
5. Irish King	Wm. Rennie	13	1,456	12	1,476	13	466
6. Selected Hall's Westbury	Wm. Rennie	14	512	12	288	13	400
7. Canadian Gem	Wm. Rennie	12	1,872	12	816	12	1,344
8. Invicta Bronze Top	Wm. Rennie	11	1,628	12	1,740	12	684
9. Good Luck	Exp. Station, Fredericton	12	1,344	11	836	12	90
10. Selected Magnum Bonum	Wm. Rennie	11	1,100	11	1,760	11	1,430
11. Imp. Jumbo or Elephant	Wm. Rennie	11	1,760	11	704	11	1,232
12. Kentville Green Top	Exp. Station, Kentville	10	1,912	11	1,760	11	836
13. Good Luck	Exp. Station, Ste. Anne	11	1,760	10	1,648	11	704
14. Good Luck	Steele Briggs	11	308	11	1,100	11	704
15. Kangaroo Bronze Green Top	Wm. Rennie	11	968	11	176	11	572
16. Elephant 1,474 C	Mackenzie Seed Co	11	176	10	1,120	10	1,648
17. Durham	Steele Briggs	10	988	9	1,800	10	394
18. Hazard's Improved Swede	Steele Briggs	9	1,636	10	460	9	1,998
19. Canadian Gem	Exp. Station, Kentville	7	1,312	8	1,160	8	236
20. Monarch Nappan	Exp. Farm, Ottawa	7	256	6	1,860	7	58
Average						11	1,897

MANGELS

Eight varieties were sown May 29 in rows 30 inches apart, harvested October 5; the following yields were obtained:—

TEST OF MANGEL VARIETIES

Variety	Source	First Plot Yield per Acre		Second Plot Yield per Acre		Average Yield per Acre	
		Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
Giant Yellow Intermediate	Steele Briggs	9	1,668	9	1,800	9	1,734
Perfection Mammoth Red	Wm. Rennie	7	1,840	10	1,120	9	480
Giant White Sugar Mangel	"	9	480	8	1,820	9	150
Yellow Leviathan	"	7	388	9	876	8	632
Mammoth Long Red	Steel Briggs	8	368	7	1,576	7	1,972
Golden Flesh Tankard	"	7	256	7	1,840	7	1,048
White Feeding Sugar Beet	Wm. Rennie	7	520	7	1,180	7	850
Giant White Sugar Mangel	Steele Briggs	6	408	7	1,180	6	1,794
Average						8	583

FIELD CARROTS

Five varieties of field carrots were under test, sown May 29, harvested October 6; the yields were as follows:—

Variety	Average Yield per Acre	
	Tons	Lbs.
1. Mammoth White Intermediate (Rennie)	8	1,952
2. Improved Short White (Steele Briggs)	7	652
3. Danish Champion (Ottawa)	6	1,068
4. White Intermediate C.C. (Summerland)	2	1,940
5. Long Orange or Ed. Surrey (Steele Briggs)	2	1,808
Average	5	1,484

SUGAR BEETS

Four varieties of sugar beets were tested in duplicate plots, sown May 29, harvested October 5, the following yields being obtained. Samples of each variety under test were forwarded to the Dominion Chemist, Central Experimental Farm, for analysis:—

TEST OF SUGAR BEETS

Variety	Source	First Plot Yield per Acre		Second Plot Yield per Acre		Average Yield per Acre	
		Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
1. Sugar Beet 1,430	Mackenzie Seed Co.	10	196	7	184	8	1,190
2. Sugar Beet, Kitchener	Dominion Sugar Co.	6	276	6	1,200	6	738
3. Sugar Beet, British Columbia	" "	5	1,880	5	428	5	1,154
4. Sugar Beet, Chatham	" "	5	1,220	5	296	5	758
Average						6	960

HAY AND PASTURE

In 1917 a number of grasses, clovers and alfalfa were sown in various mixtures and combinations. The legumes were used as a basis, to which were added the following grasses: western rye, brome, timothy, meadow fescue, orchard, tall oat, Kentucky blue and red top, in varying amounts and combinations. Hay was harvested in 1918, 1919, and 1920; the following table gives the yield for each year and the average yield for the period that these plots were cropped:—

PARTICULARS AND YIELDS OF HAY FROM GRASSES, CLOVERS AND ALFALFA

Mixture and Rate Sown per Acre		1918		1919		1920		Average	
		Tons	Lb.	Tons	Lb.	Tons	Lb.	Tons	Lb.
No. 1. Red clover	12 lb.								
No. 2. Red clover	10 "								
Timothy	8 "	1	1,360	1	480	2	900	1	1,580
No. 3. Red clover	10 "								
Western rye	8 "	2	860	3	1,300	2	1,680	2	1,947
No. 4. Red clover	10 "								
Meadow fescue	15 "	1	1,200	1	1,880	2	980	2	20
No. 5. Red clover	10 "								
Orchard grass	15 "	–	1,940	–	–	–	–	–	–
No. 6. Red clover	10 "								
Tall oat grass	15 "	1	900	2	900	2	1,780	2	527
No. 7. Red clover	10 "								
Kentucky blue grass	12 "	–	1,860	1	1,300	2	580	1	1,247
No. 8. Red clover	10 "								
Red top	12 "	1	280	2	700	2	1,200	2	60
No. 9. Red clover	10 "								
Timothy	6 "								
Western rye	6 "	2	400	2	1,700	2	740	2	947
No. 10. Red clover	10 "								
Timothy	5 "								
Western rye	5 "								
Kentucky blue grass	4 "								
Red top	4 "	2	60	3	–	2	840	2	967
No. 11. Red clover	10 "								
Meadow fescue	6 "								
Orchard grass	6 "								
Tall oat grass	6 "	1	1,300	1	1,720	2	–	1	1,673
No. 12. Red clover	10 "								
Meadow fescue	5 "								
Orchard grass	5 "								
Tall oat grass	5 "								
Kentucky blue grass	4 "								
Red Top	4 "	1	1,100	1	600	1	1,500	1	1,067
No. 13. Alsike clover	6 "	1	60	2	700	2	520	1	1,760

PARTICULARS AND YIELDS OF HAY FROM GRASSES, CLOVERS AND ALFALFA—*Con.*

Mixture and Rate Sown per acre		1918		1919		1920		Average	
		Tons	Lb.	Tons	Lb.	Tons.	Lb.	Tons	Lb.
No. 14. Alsike clover	4 lb.								
Timothy	8 "	1	1,200	1	1,720	2	-	1	1,640
No. 15. Alsike clover	4 "								
Western rye	8 "	2	760	4	200	2	1,580	3	180
No. 16. Alsike clover	4 "								
Meadow fescue	15 "	1	1,240	1	1,940	1	1,760	1	1,647
No. 17. Alsike clover	4 "								
Orchard grass	15 "	1	200	1	800	1	800	1	600
No. 18. Alsike clover	4 "								
Tall oat grass	15 "	1	520	2	400	1	1,560	1	1,493
No. 19. Alsike clover	4 "								
Kentucky blue grass	12 "	1	840	1	1,000	1	1,660	1	1,167
No. 20. Alsike clover	4 "								
Red top	12 "	1	1,000	2	-	1	1,880	1	1,627
No. 21. Alsike clover	4 "								
Timothy	6 "								
Western rye grass	6 "	2	860	2	1,800	1	1,660	2	773
No. 22. Alsike clover	4 "								
Timothy	5 "								
Western rye grass	5 "								
Kentucky blue grass	4 "								
Red top	4 "	2	1,000	2	1,740	2	60	2	933
No. 23. Alsike clover	4 "								
Meadow fescue	6 "								
Orchard grass	6 "								
Tall oat grass	6 "	1	600	1	500	1	1,100	1	733
No. 24. Alsike clover	4 "								
Meadow fescue	6 "								
Orchard grass	6 "								
Tall oat grass	6 "								
Kentucky blue grass	4 "								
Red top	4 "	2	-	1	300	1	1,580	1	1,293
No. 25. Red clover	10 "								
Alsike clover	4 "	1	1,040	2	800	2	380	2	73
No. 26. Red clover	8 "								
Alsike clover	2 "								
Timothy	8 "	1	1,780	2	300	2	580	2	220
No. 27. Red clover	8 "								
Alsike clover	2 "								
Western rye	8 "	1	1,400	4	400	2	1,220	3	340
No. 28. Red clover	8 "								
Alsike clover	2 "								
Meadow fescue	15 "	1	320	2	1,400	1	1,640	1	1,787
No. 29. Red clover	8 "								
Alsike clover	2 "								
Orchard grass	15 "	1	480	1	1,200	1	1,340	1	1,007
No. 30. Red clover	8 "								
Alsike clover	2 "								
Tall oat grass	15 "	1	160	1	1,800	1	740	1	900
No. 31. Red clover	8 "								
Alsike clover	2 "								
Kentucky blue grass	12 "	-	1,400	-	1,600	1	960	-	1,987
No. 32. Red clover	8 "								
Alsike clover	2 "								
Red top	12 "	-	1,760	1	1,300	1	460	1	507
No. 33. Red clover	8 "								
Alsike clover	2 "								
Timothy	6 "								
Western rye	6 "	2	500	2	1,340	1	1,800	2	547
No. 34. Red clover	8 "								
Alsike clover	2 "								
Timothy	5 "								
Western rye	5 "								
Kentucky blue grass	4 "								
Red Top	4 "	1	1,760	2	1,160	1	1,320	2	80
No. 1. L. White clover	8 "								
Timothy	8 "	1	1,400	1	1,360	1	960	1	1,240
No. 2. L. Alsike clover	4 "								
Brome grass	8 "	3	100	3	1,740	2	1,340	3	393
No. 3. L. Red clover	10 "								
Brome grass	8 "	2	1,500	3	1,640	2	1,040	3	260

PARTICULARS AND YIELDS OF HAY FROM GRASSES, CLOVERS AND ALFALFA—*Con.*

Mixture and Rate Sown per Acre		1918		1919		1920		Average	
		Tons	Lb.	Tons	Lb.	Tons	Lb.	Tons	Lb.
No. 4. L. Red clover	10 lb.								
Western rye	6 "								
Brome grass	6 "	3	00	3	500	2	160	2	1,553
No. 5. L. Red Clover	10 "								
Timothy	5 "								
Western rye	5 "								
Kentucky blue grass	4 "								
Brome grass	4 "	2	200	2	1,200	1	1,160	2	187
No. 6. L. Red clover	6 "								
White clover	4 "								
Brome grass	8 "	2	1,020	3	1,120	2	260	2	1,467
No. 35. Red clover	8 "								
Alsike clover	2 "								
Meadow fescue	6 "								
Orchard grass	6 "								
Tall oat grass	6 "	1	860	1	760	1	480	1	700
No. 36. Red clover	8 "								
Alsike clover	2 "								
Meadow fescue	5 "								
Orchard grass	5 "								
Tall oat grass	5 "								
Kentucky blue grass	4 "								
Red top	4 "	1	1,060	–	1,500	1	440	1	333
No. 37. Alfalfa	12 "	1	1,700	5	300	1	1,200	2	1,733
No. 38. Alfalfa	10 "								
Timothy	8 "	1	1,520	2	1,320	1	1,040		
No. 39. Alfalfa	10 "	–							
Western rye	8 "	2	1,300	3	300	2	840	2	1,480
No. 39A. Brome grass	20 "	3	820	4	1,340	1	120	3	1,427
No. 40. Alfalfa	10 "	2	1,000	2	900	1	920	2	273
Meadow fescue	15 "								
No. 41. Alfalfa	10 "								
Orchard grass	15 "	1	1,760	2	380	–	1,440	1	1,193
No. 42. Alfalfa	10 "								
Tall oat grass	15 "	1	1,360	4	300	–	1,800	2	487
No. 43. Alfalfa	10 "								
Kentucky blue grass	12 "	1	40	2	1,480	1	200	1	1,240
No. 44. Alfalfa	10 "								
Red Top	12 "	1	360	2	360	1	300	1	1,007
No 45. Alfalfa	10 "								
Timothy	6 "								
Western rye	6 "	1	1,200	4	160	2	160	2	1,173
No. 46. Alfalfa	10 "								
Timothy	5 "								
Western rye	5 "								
Kentucky blue grass	4 "								
Red Top	4 "	1	920	3	200	2	300	2	473
No. 47. Alfalfa	10 "								
Meadow fescue	6 "								
Orchard grass	6 "								
Tall oat grass	6 "	1	160	3	340	1	200	1	1,567
No. 48. Alfalfa	10 "								
Meadow fescue	5 "								
Orchard grass	5 "								
Tall oat grass	5 "								
Kentucky blue grass	4 "								
Red top	4 "	1	00	2	1,000	1	180	1	1,060
No. 49. Kentish wild white clover		–	–	3	1,420	–	1,820	1	1,080

Due to exceptionally unfavourable weather conditions during the years these mixtures were under test, the plots were by 1920 very weedy and were only left in during 1920 for the purpose of observing what grasses and legumes survived in the original mixtures. For this reason the 1920 yields do not represent the original mixtures seeded, as weeds and volunteer grasses had by 1920 in a considerable number of plots, crowded out the original seeding.

Red clover did not appear in the 1918 crop, consequently the yields of mixtures containing red clover are yields of the grasses in the mixtures only. Orchard grass

killed out entirely during the winter of 1918-19 where sown with red clover or alsike, and survived, but to a very slight extent where sown with alfalfa. Of the legumes, alfalfa, to date, has been found most suitable, either when sown alone or in combination with one or more of the grasses. Western rye is the most suitable grass for hay in this district, brome grass being the only one that has given higher yields. Brome grass is both earlier and later than any other grass or legume, and for this reason has its greatest value as a pasture. Under certain conditions due to its creeping root stocks and spreading habit it may be difficult to keep in check, but with proper cultural methods it is not hard to eradicate. Timothy has not produced as heavy yields as brome or western rye, and is not generally suited to this district. Compared with western rye, Kentucky blue is not a heavy hay producer, its chief value being as a bottom grass in hay and pasture mixtures. Red top has no value for upland hay, but can be recommended for sloughs and swampy places.

On uniform soil there appears to be little gained by combining the different grasses for hay, as the strongest grass tends to crowd out the other, the yield of the best grass being lowered by the poor one. However, by the addition of a suitable legume to the grasses the feeding value of the hay can be considerably increased.

HORTICULTURE

The season of 1920 was a very unfavourable one for horticultural work. The winter of 1919-20 was one of the worst in the history of the Station. Snow was late in disappearing, so that work on the land was very much delayed, and the first sowing of seed in the open did not take place until May 14.

TREE FRUITS

So far there has been little success with large fruits at the Lacombe Station, although there is still hope that hardier varieties will be obtained which will succeed well here. There has been in five past years fruit off the hybrid crab apples originated by the late Dr. Wm. Saunders, but in time most of the trees of these were winter-killed or were so injured that they were removed. There is now, however, greater protection for the orchard site, and it is hoped that better success will follow another test of the hardiest sorts.

The old apple orchard which was discarded in 1918 was again left vacant to clean the ground thoroughly of grass which had previously overrun the land, and it is intended to replant in the ensuing spring.

The seedling apple trees continue to kill back, and, of the large number previously planted, very few came through the severe winter without severe injury.

There have been under test a number of seedlings of the Manitoba Wild Plum. Some of these have borne fruit in nursery rows where they got a certain amount of protection. The spring frosts which destroy the bloom have much to do in preventing success with the plum.

SMALL FRUITS

Although the large fruits have not so far been grown very successfully at Lacombe, good results have been obtained with small fruits, including black and red currants, raspberries, gooseberries, and strawberries.

In 1920, among small fruits, black currants, raspberries and strawberries were the most satisfactory and, while yields were approaching the average, still they left much to be desired. This was owing to lack of rain, the season of 1920 being one of the driest on record. Gooseberries gave large yields of fruit, but, owing to being badly infested with rust, much of the fruit was left unpicked.

BLACK CURRANTS.—The black currant does particularly well here, and the bushes have borne large crops. Some of the varieties which have done best over a term of years are Beauty, Climax, Black Naples, Eagle, Kerry, and Magnus.

RED CURRANTS.—The red currants, also, have yielded well. It has been found that some varieties are much hardier than others. Some of the most reliable sorts have been Red Grape, Red Dutch, and Long Bunch Holland.

RASPBERRIES.—There have been good crops of raspberries, but, as with the currants, there is a marked difference in hardiness. The Sunbeam, while, perhaps, the hardiest of those under test, is not so good in quality as the Herbert, which, in most seasons, yields a good crop and is excellent in quality. The Sarah, a later sort, has done well also, as has the King and Loudon.

GOOSEBERRIES.—Gooseberries have not been so successful as currants and raspberries. Unless the plants are protected the flowers are liable to be killed. If, however, the bushes are covered with soil in the autumn a good crop may be expected of at least the Houghton, which has proved the most reliable sort.

STRAWBERRIES.—If strawberries are mulched with straw during the winter, and care is taken to leave the mulch on in the spring as long as possible without the plants growing under it, they will, to a large extent, escape the spring frosts which so often reduce the crop very much. The variety which has given best results is the Senator Dunlap, but the everbearing sorts, such as Americus and Progressive, do fairly well also.

ORNAMENTAL TREES AND SHRUBS

The ornamental trees and shrubs at the Lacombe Experimental Station are doing well on the whole. When the grounds were laid out and the trees planted here there was the experience gained at the Experimental Farms at Brandon and Indian Head as a guide as to what to plant, hence, although the climate was somewhat different at Lacombe, there were not as many failures as there would have been had this information not been available. Many species are under test, and most of the specimens have developed so well that they add very much to the attractiveness of the Station, and are much admired by visitors who are able to see what would look best and succeed best on their own places.

Some of the most conspicuous and ornamental are the following: *Caragana arborescens,* or Siberian Pea Tree, one of the most reliable shrubs for the Prairie Provinces. *Caragana frutescens,* a lower growing species of Caragana, but one with more conspicuous flowers than the last. *Caragana pygmaea,* this is a low growing shrub which appears as hardy as the others, and is quite effective along the roadway *Tartarian Bush Honeysuckle* (Lonicera tatarica), a well-known shrub, and one of the most satisfactory for the Prairie Provinces, as it is very hardly and very ornamental. *Lilacs.* While the ordinary lilacs are not very satisfactory, as they usually kill back more or less, the Chinese or Himalayan lilac, Syringa villosa, is very hardy and blooms well here. *Spiraeas.* The spiraeas are very ornamental because of their profusion of bloom. The earliest to bloom is the Snow Garland, Spiraea arguta, which is hardier than Van Houtte's Spiraea, which blooms a little later. Of the summer blooming sorts, the Spiraea sorbifolia does well, as does also Spiraea Billardii. *Japanese Rose.* The Japanese rose, Rosa rugosa, has a long season of bloom, and the foliage is also attractive.

Other good shrubs are the Golden Currant (*Ribes aureum*), High Bush Cranberry, and Siberian Dogwood. The rose known as Rosa rubrifolia has done well here.

Among trees some of the most satisfactory have proven to be the Box Elder, Canoe Birch, Russian Poplar (*Populus petrowskyana*), Black Poplar, (*Populus nigra*), Balsam Poplar, Mountain Ash, Laurel-leaved Willow, the willow known as Salix daphnoides acutifolia, and Tartarian Maple, and a species of cherry known as Prunus grayana. The American elm and green ash are only fairly satisfactory here. The

growth of the elms is slow, but each year adds to their appearance, and they are worthy of greater consideration than they at present receive.

Among evergreens, some of those succeeding best are White Spruce, Colorado Blue Spruce, Lodgepole Pine, Scotch Pine and Savin Juniper.

HEDGES

The hedges are an interesting feature of this Station, and there is now a very representative collection of the trees and hardy shrubs here included in the test for hedge purposes. Among those which have proved the most satisfactory are Siberian Pea Tree (*Caragana arborescens*), Laurel-leaved Willow, and White Spruce.

FLOWERS AND LAWNS

Quite a continued display of flowers was in evidence during the season. Many of the perennials began blooming in June, and were followed in due season by the hardy and half hardy annuals. The period of bloom of some varieties was somewhat short, owing to the dry weather.

The lawns were green and in good condition during June and early July, but from the end of July there was not sufficient growth to require any mowing, and labour in this usually heavy work was reduced to a minimum. While the outward appearance was very discouraging, the condition of the turf does not appear to be impaired in any way, and with the winter moisture its former freshness will in all probability be revived.

VEGETABLES

Vegetables gave very fair results under the adverse conditions of the late spring and hot, dry summer. Yields of cabbages were much below the average, since this crop requires an abundance of moisture. The season was most favourable for the ripening of onions and the growing of onion sets from seed. The onion sets grown here in the past season were the best crop secured for several seasons for yield, uniformity and size. A few varieties of tomatoes gave ripe fruit. All of these were strains of seed grown at Ottawa. The three best varieties were Alacrity, Burbank Early, and Danish Export. The following table shows how different varieties under test succeeded:—

UNIFORM TEST PLOTS OF TOMATOES, FIVE PLANTS OF EACH VARIETY

—	Date Sown	Date Planted	Date Ripe	Weight Ripe Fruit	Weight Green Fruit	Total Weight Fruit
				lb. oz.	lb. oz.	lb. oz.
1. Danish Export	4—V	28—VI	29—VIII	1 — 4	20 — 8	21 — 12
2. Burbank Early	"	"	31—VIII	1 — 4	32 — 4	33 — 8
3. Alacrity	"	"	31—VIII	— 10	27 — 8	28 — 2
4. Earlibell	"	"	8—IX	— 12	23 — 0	23 — 12
5. Prosperity	"	"	9—IX	— 8	29 — 4	29 — 12
6. Earliana	"	"	.....	.....	32 — 8	32 — 8
7. Bonny Best	"	"	.....	.....	17 — 4	17 — 4
8. Red Head	"	"	.....	.....	13 — 8	13 — 8
9. Chalk Early Jewel	"	"	.....	.....	10 — 12	10 — 12
10. John Baer	"	"	.....	.....	8 — 0	8 — 0

PEAS

Peas are usually a satisfactory crop at Lacombe. The following table shows the behaviour of the different varieties under test in 1920:—

UNIFORM TEST PLOTS OF GARDEN PEAS AT LACOMBE 1920, 30-FOOT ROW OF EACH

—	Date Sown	Date Ready for Use	Yield of Dry Peas
			lb. oz.
1. Gradus	15—V	20 — VII	11 — 0
2. Thomas Laxton	"	16 — VII	10 — 4
3. Manifold	"	23 — VII	9 — 15
4. Early Morn	"	16 — VII	9 — 14
5. Gregory Surprise	"	16 — VII	9 — 11
6. American Wonder	"	24 — VII	9 — 9
7. Stratagem	"	31 — VII	9 — 9
8. Senator	"	20 — VII	9 — 2
9. Carter Eight Weeks	"	19 — VII	8 — 4
10. Prosperity	"	16 — VII	8 — 0
11. English Wonder	"	18 — VII	8 — 0
12. Laxtonian	"	20 — VII	7 — 13
13. Sutton Excelsior	"	20 — VII	7 — 3
14. Little Marvel	"	20 — VII	6 — 14
15. McLean Advancer	"	24 — VII	6 — 9
16. Champion of England	"	31 — VII	4 — 6
17. Blue Bantam	"	24 — VII	4 — 0
18. Pioneer	"	28 — VII	2 — 10

BEANS

The bean is one of the vegetables which succeeds well at Lacombe, and a plentiful supply is usually assured by the planting of a few sorts of different seasons to cover the season. In the following table will be found a list of the varieties tested in 1920, with time of being ready for use and yield:—

UNIFORM TEST PLOT OF BEANS AT LACOMBE, 1920, 15-FOOT ROW OF EACH VARIETY

	No. of Pickings	Date Sown	Date Ready for Use	Yield of Green Beans
				lb. oz.
1. Pencil Pod Kidney Wax	Three	22—V	31 — VII	14 — 4
2. Plentiful French	"	"	2 — VIII	11 — 3
3. Masterpiece	"	"	4 — VIII	11 — 3
4. Fordhook Favorite	"	"	2 — VIII	9 — 2
5. Bountiful	"	"	2 — VIII	8 — 9
6. Matchless Green Pod	"	"	2 — VIII	6 — 12
7. Grennell Rustless Wax	"	"	2 — VIII	6 — 2
8. Davis White Wax	"	"	2 — VIII	6 — 0
9. Hodson Wax	"	"	10 — VIII	6 — 0
10. Extra Early Valentine	"	"	31 — VII	4 — 13
11. Wardwell Kidney Wax	"	"	2 — VIII	4 — 6
12. Round Pod Kidney Wax	"	"	2 — VIII	4 — 4
13. Refugee or 1000 to 1	"	"	16 — VIII	3 — 12
14. Stringless Green Pod	"	"	2 — VIII	2 — 12

Beans were injured by frost June 12, and were frozen off August 31.

The following table presents the average yields of the different varieties of potatoes which have been grown at this Station during the years 1916 to 1920, inclusive:—

Variety	No. of Years	Average Yield
		bush. lb.
1. Table Talk	Five	427 — 27
2. American Wonder	"	394 — 8
3. Early Hebron	"	385 — 13
4. Houlton Rose	"	377 — 44½
5. Carter Early Favorite	"	368 — 14
6. King Edward VII	"	362 — 2½
7. Irish Cobbler	"	350 — 41
8. Early Northern	"	346 — 23
9. Epicure	"	334 — 16
10. Ashleaf Kidney	"	334 — 11
11. Country Gentleman	"	327 — 28
12. Wee McGregor	"	320 — 8
13. Gold Coin	"	310 — 58
14. Burnaby Mannoth	"	304 — 2½
15. Extra Early Eureka	"	297 — 40
16. Empire State	Four	437 — 48
17. Duchess of Norfolk	"	325 — 5
18. Duke of York	"	215 — 3
19. Early Ohio	Three	344 — 40
20. Green Mountain	"	285 — 54
21. Dalmeny Regent 7181	"	244 — 56
22. Dalmeny Hero 7198	"	140 — 28
23. Morton 8349	Two	203 — 31
24. Dalmeny Regent 8320	"	132 —
25. Brydon	"	99 —
26. Dalmeny Hero 8347	"	84 — 42

It will be noticed that Table Talk heads the list in the five-year average. This potato is a smooth, half-round, white potato of excellent eating qualities. American Wonder, which comes second in the list, is a half-long, white potato. The Irish Cobbler, although it does not head the list at this Station, is one of the best potatoes for localities which have a shorter growing season than this district, while the Early Ohio is undoubtedly the most suitable variety for the northern part of this province. The Wee McGregor is a smooth, round, white potato, worthy of consideration. The Empire State, a half-long, white potato, always produces a fairly large yield of marketable potatoes, and is also least susceptible to rot of any of our heavy yielding varieties.

POULTRY

In this part of Alberta the average farm has more or less poultry, and the interest taken in poultry-keeping is particularly keen. The good prices received during the past few years have also tended to increase this interest, until at the present time considerable information is sought by farmers on poultry work, including turkeys, geese and ducks.

The poultry plant is located upon ten acres of land included in which is a lake, and upon one edge of this is a small amount of scrub. The site is somewhat exposed to the wind, but trees and shrubs have been planted, and this disadvantage will be removed in a few years' time.

The lake with its surrounding brush makes an ideal location for poultry, and especially for water fowl. Many of the farms in this locality have areas of this nature upon which poultry might be, and in some cases are being, profitably kept.

HOUSING

Several styles of buildings have been used, some being more satisfactory than others. The small colony house of 6 by 8 feet has not proved as satisfactory as the larger colony house of 10 by 12 feet. The latter is small enough to be hauled over level ground, and is large enough to give good protection to the fowl in the winter.

Among the permanent houses used have been houses 16 feet deep with glass and cotton in front, similar to plans issued by the Poultry Division. There has also been used to advantage a log house that was remodelled from an old log residence, fitted up with the glass and cotton front. There are a number of log houses in this country that with profit could be remodelled into excellent poultry houses, but care should be taken to allow plenty of sunlight and ventilation. This can best be given by the glass and cotton front.

The third style of a permanent house which has been tried is a straw house. This has been only fairly satisfactory and is recommended merely as a temporary accommodation. This house was built first with baled straw, and as long as the bales were kept tightly chinked and in position it gave fair results. Later the bales were replaced by building two wire fences three feet apart, and tramping loose straw in tightly between the fences. This formed the three walls of the house, the front being arranged with the cotton and glass, similar to the other houses. The roof was built first with poles and straw, but afterwards this was replaced by boards and shingles.

The straw house cannot be recommended as a permanent structure, but for a temporary building, if properly built, it proves quite satisfactory. Care must be taken, however, to see that the house, whether made of baled straw or straw tramped between wire fence, is gone over carefully every year; sometimes the straw will have to be renewed and occasionally the bales require replacing. For a permanent house that has to be built we recommend the house 16 feet wide and 32 feet long to accommodate 100 hens. Such a house, though it does not keep water from freezing in the cold weather, gives ideal conditions in which the birds thrive and lay. Plans for such a house are available for the asking. For those who have a log building that can be used for poultry we would advise remodelling as per suggestions given.

For brooding, the movable colony house, in which is placed a coal-burning brooder stove, is used. This is one of the best types of brooders that has been used at this Station, and is recommended for persons raising a couple hundred or more chicks.

HATCHING

Incubation is done by means of a Candee incubator placed in the basement of the administration building. Other small machines are used, but most of the eggs are hatched in the large machine, and results are quite satisfactory from year to year.

TRAP-NESTS

Trap-nests are installed in all the houses, and a record kept of the individual production. The style of trap-nest used is simple, and can be easily made by any person wishing to install a trap. Trap-nests, however, are not recommended for every person who is keeping poultry. Considerable time is occupied looking after them, and if they are not attended to properly they are worse than no trap-nests at all; but they are recommended most heartily to those who wish to grade up a flock of their own birds, and from which they wish to sell, each year, cockerels of known parentage. The aim here is to select from pullets each year those that have made the best records, and, provided they themselves come up to regulations in type and colour, they are retained the second year for breeding purposes.

FEEDING

The system of feeding the layers is as follows: mixed grain—wheat, oats and barley, or any other mixture of home-grown grains, is fed in a heavy litter each morning and each afternoon, care being taken to give it early enough in the afternoon that the birds have time to eat all they require before they go to roost. This scratch feed is thrown in the litter in order to keep the birds busy throughout the day. In addition to this there is a dry mash hopper before the birds at all times. The dry mash is composed of crushed oats, or a mixture of bran, shorts and corn meal. In fact, any mixture which the birds are fond of will serve the purpose. Milk is also provided the birds, if it can be obtained, and milk cannot be too highly recommended for poultry use; it supplies considerable animal feed, and also serves as a tonic which tends to keep the birds healthy and vigorous. If milk is not obtainable, animal feed in some form should be given, and may be supplied either by raw meat or in the commercial form known as beef-scrap.

Green feed is also supplied, and is quite a necessity if winter eggs are wanted. It can be supplied either by roots, clover, silage, vegetables of any kind, or sprouted grains. Grit and shell are left before the birds. These can be supplied in the commercial material or can be given in the form of finely ground rock or gravel, crushed egg shells, or plaster.

EXPERIMENTS

The experimental work conducted this year has, for various reasons, not covered as much ground as was expected. A comparison of hatching results is given, and a comparison of hens and pullets for winter production, while a comparison of the pullets of the three breeds kept is also included.

COMPARISON OF HATCHING RESULTS FROM BARRED PLYMOUTH ROCKS, WHITE WYANDOTTES AND RHODE ISLAND REDS

Breed	Eggs Set	Fertile	Fertile Eggs Hatched
		%	%
Rocks	800	67·5	51·8
Wyandottes	750	70·0	49·5
R. I. Reds	827	69·7	43·3

The above figures include all eggs set, both early and late, as well as those used in an experimental way.

HATCHING RESULTS FROM HENS AND PULLETS

Ages	Eggs Set	Fertile	Fertile Eggs Hatched
		%	%
Hens	720	80	43·75
Pullets	922	62·4	51·5

These figures would indicate that pullets were slightly superior to hens for hatching results, but the rearing of the chicks is definitely in favour of the older birds, as the mortality was only one half as large in the chicks from the hens as in the chicks from the pullets.

HATCHING RESULTS FROM MARCH AND APRIL HATCHES

Month	Eggs Set	Fertile	Fertile Eggs Hatched
		%	%
March	1227	70	45·4
April	1150	68	51·1

This gives April as slightly better than March in hatching. In former years, when a comparison was made also with May and June, April was still ahead, and the later months were behind March. The mortality also is less in the April hatches, and the growth better. April hatches are, therefore, recommended for best chicks.

COMPARISON OF HENS AND PULLETS FOR WINTER LAYERS FOR THE SIX WINTER MONTHS OF 1920–21

Breed and No.	October		November		December		January		February		March		Totals		Average per	
	Hens	Pullets	Hens	Pullets	Hens	Pullets	Hens	Pullets	Hens	Pullets	Hens	Pullets	Hens	Pullets	Hens	Pullets
Barred Rocks, 19.....	66	.....	62	.....	47	.....	54	.....	124	.....	192	.....	545	.....	28·7	
Barred Rocks, 25.....	108	.....	42	.....	64	.....	44	.....	68	.....	99	.....	425	.....	17·0	
White Wyandottes, 25...	68	.....	28	.....	58	.....	50	.....	143	.....	154	.....	501	.....	20·0	
Rhode Island Reds, 25..	18	.....	7	.....	20	.....	12	.....	156	.....	249	.....	462	.....	18·5	
White Wyandottes, 26...	.....	203	.....	316	.....	322	.....	336	.....	442	.....	551	.....	2,170	.....	8·35
Barred Rocks, 19.....	.....	30	.....	126	.....	223	.....	120	.....	219	.....	262	.....	980	.....	51·6
Barred Rocks, 25.....	.....	129	.....	118	.....	194	.....	107	.....	217	.....	266	.....	1,031	.....	41·2
Rhode Island Reds, 25..	.....	54	.....	158	.....	373	.....	249	.....	294	.....	419	.....	1,547	.....	61·9
Total eggs.....	260	416	139	718	189	1,112	160	812	491	1,172	694	1,498	1,933	5,728	20·8	60·3
Value of eggs.....	$10.83	$17.43	$6.95	$35.90	$11.02	$64.80	$9.33	$47.33	$23.55	$58.60	$17.52	$37.45	$79.20	$261.48	$0.84	$2.75

In this table the results are decidedly in favour of pullets for winter layers. With the mature hens the egg production showed a slight decrease as the winter progressed, until the month of February, while the pullets showed a decided increase with the exception of the month of January, when the egg yield fell off. In other words, the pullets produced a larger percentage of high-priced eggs than did the mature hens. While the mature hens laid approximately 33 per cent as many eggs as the pullets, the value of the eggs produced is only 30·9 per cent of the value of eggs laid by the pullets. In figuring the value of the eggs produced, the following prices for the different months were charged: October, 50 cents; November, 60 cents; December, 70 cents; January, 70 cents; February, 60 cents; March, 30 cents.

With the exception of one White Wyandotte pullet extra, the proportion of pullets to hens is equal; there being 94 hens and 95 pullets in the experiment.

It cost an average of 86 cents each to feed the hens and pullets for the six winter months. As the income from the mature hens averaged 84·2 cents per bird, they lacked 1·8 cents of paying for their feed, and the cost of their care and housing was a total loss. The income from the pullets amounted to $2.75 per bird. This gives them a profit of $1.89 per bird over the cost of feed.

COMPARISON OF WHITE WYANDOTTES, BARRED ROCKS AND RHODE ISLAND REDS FOR WINTER LAYERS FOR THE SIX WINTER MONTHS OF 1920-21

—	White Wyandottes				Barred Rocks				Rhode Island Reds			
	No. of birds	No. of eggs	No. of eggs per bird	Value of eggs	No. of birds	No. of eggs	No. of eggs per bird	Value of eggs	No. of birds	No. of eggs	No. of eggs per bird	Value of eggs
October	51	271	5·3	$11.29	88	333	3·78	$13.88	50	72	1·44	$3.00
November	51	344	6·75	17.20	88	348	3·95	17.40	50	165	3·30	8.25
December	51	380	7·45	22.17	88	528	6·0	30.80	50	393	7·86	22.92
January	51	386	7·57	22.52	88	325	3·7	18.96	50	261	5·22	15.23
February	51	585	11·47	29.25	88	628	7·14	37.68	50	450	9·0	22.50
March	51	705	13·82	17.62	88	819	9·3	20.47	50	668	13·3	16.70
Total hens	51				88				50			
Total eggs		2,771				2,985				2,009		
Total value				$120.05				$139.19				$88.60
Average number of eggs per bird			54·3				33·9				40·2	
Average value of eggs per bird				$2.36				$1.58				$1.77

In this experiment the White Wyandottes averaged 14·1 more eggs per bird than the Rhode Island Reds, and 20·4 more eggs per bird than the Barred Rocks. In comparing the average value of the eggs laid per bird, the White Wyandottes led with $2.36 per bird; the Rhode Island Reds were second with $1.77 per bird, and the Barred Rocks third with $1.58 per bird.

BEES

In the fall of 1919 six colonies of bees were put away for the winter in a darkened room in the basement of the office. This room has an average temperature of 50 degrees. They were all good strong colonies when examined on May 25, 1920.

Despite that the season of 1920 was one of the driest on record at this Station, the colonies produced an average of 67⅔ pounds of honey, while the heaviest yielding colony produced 87 pounds of extracted honey; also, one colony gave off a small swarm.

During a period of 22 days following July 8, one colony produced an average of three pounds of honey a day, and for the four days, July 23 to 26 inclusive, it averaged four pounds of honey per day. It is interesting to note that, during the period in which this colony was averaging an increase of four pounds per day, there was a nice heavy shower every other day, followed by bright clear weather. During the twenty-two days' period there were 255 hours sunshine and 1·27 inches of rainfall.

The honey season was finished by August 5, and the bees began to use up their winter supplies about August 10. This sudden finishing of the honey season was mainly due to the extremely dry weather, which caused practically all vegetable growth to cease.