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DOMINION OF CANADA  
DEPARTMENT OF AGRICULTURE  
DOMINION EXPERIMENTAL FARMS

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# EXPERIMENTAL STATION

KAPUSKASING, ONT.

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REPORT OF THE SUPERINTENDENT  
SMITH BALLANTYNE

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FOR THE YEAR 1929

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Published by authority of Hon. Robert Weir, Minister of Agriculture,  
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# DOMINION EXPERIMENTAL STATION, KAPUSKASING, ONTARIO

## REPORT OF THE SUPERINTENDENT, SMITH BALLANTYNE

### THE SEASON

January, May, June, September, October, November, and December were all colder than usual, being 2.4, 1, 0.5, 0.7, 0.2, 1.1, and 2.7 degrees respectively below the average for a twelve-year period. February was 0.2, March 3.5, April 2.3, and July 2.2 degrees warmer than the twelve-year average for these same months, while the mean temperature for August was exactly the same as the twelve-year average.

The total precipitation for the year was 32.52 inches which is 7.06 inches above the twelve-year average of 25.46. This was the second highest precipitation received during the last twelve years, being surpassed only in 1921 when 37.68 inches were received.

During the five growing months, May 1 to September 30, 16.46 inches were received which equalled 50.62 per cent of the total for the year, while the average amount received during the same months over a twelve-year period was 13.70 inches or 53.8 per cent.

The comparatively warm weather during March and April had the effect of clearing the fields of snow at an early date. In fact as early as April 6, practically all of the snow was gone from the open fields. This was unfortunate, in that it left the alfalfa, clovers and fall grains without any protection against the heavy frosts which occurred later and as a result they suffered severely and in many cases were entirely killed.

During the latter half of April and the first two days of May the weather was quite warm and as there had been comparatively little precipitation during this period the ground became dry on top and in fairly good condition for seeding although the frost was not out to any great depth at this time. Garden peas were planted on May 1 and 2.3 acres of Garnet wheat were seeded on May 2. Five inches of snow on May 3 and 1 inch on May 4 prevented any further seeding until May 10, when beets, carrots, lettuce, radish and some other vegetables were planted in the garden. Three acres of sunflowers and 1 acre of wheat were seeded on May 14, but 10 inches of snow on May 15 followed by 6 inches on May 17, plus some rain on May 21, 22 and 23 prevented any further work on the land until May 27, and even at this late date the soil was not in ideal condition for cultivation. The great majority of the crops were not seeded until June. In fact the seeding operations in general were the latest in the history of the Station. Owing to late seeding germination was rapid and growth conditions were very good, particularly during June, July and August, so that all the common field crops gave reasonably good yields. Root crops and sunflowers, however, were unable to make up for the time lost in the spring and consequently gave a much lighter yield than usual.

Fortunately a very good period of hay weather occurred during the latter part of July and the first ten days of August, during which 25 days, only 0.95 inch of rain occurred. This was taken full advantage of and a fairly large tonnage of hay was harvested and stored in excellent condition.

During the first sixteen days of September rain occurred on 10 different dates and totalled 4.78 inches. This caused considerable difficulty in cutting the grain crops owing to the ground being too wet to carry the binders. However, during the last 14 days of September and the first 11 days of October only 0.77 inch of precipitation occurred and during this 25-day period the grain crops cured and threshed remarkably well. This was due in part, however, to the fact that practically all of the field crop grains were made up of early varieties such as Alaska oats, O.A.C. No. 21 barley, Garnet wheat, and Chancellor peas. In fact, never in the history of this Station has the value of early maturing varieties been more fully demonstrated than this year, for there seems little doubt that with the exceedingly backward spring had late maturing varieties been grown, they could not have been harvested, cured and threshed in the short period of good weather which existed after they would have been mature.

The sunshine for the year totalled 1,496.3 hours which is the least in the history of the Station and is 218.2 hours less than the average for an eleven-year period.

Although the crops were seeded unusually late very little damage occurred from late summer or early autumn frosts, and fall-ploughing was not closed down by frost until November 14.

## METEOROLOGICAL RECORDS

Month	Temperature, Degrees Fah.						Precipitation (inches)				Sunshine (hours)	
	Mean		Maximum		Minimum		Rain 1929	Snow 1929	Total precipitation		1929	Average 11 years
	1929	Average 12 years	High-est	Mean maxi-mum	Low-est	Mean mini-mum			1929	Average 12 years		
January.....	-4.6	-2.2	20	5.4	-40	-14.6	.....	23.0	2.30	1.45	96.3	33.2
February.....	2.3	2.1	27	14.5	-40	-09.9	.....	15.0	1.50	0.84	93.9	102.0
March.....	17.3	13.8	52	30.2	-37	04.5	0.61	21.5	2.76	1.40	98.7	134.5
April.....	33.5	31.2	60	44.7	-05	22.3	0.42	3.5	0.77	1.82	152.8	173.2
May.....	44.3	45.3	87	56.4	14	32.1	1.30	22.0	3.50	1.80	177.7	221.5
June.....	56.1	56.6	88	69.0	25	43.2	2.31	.....	2.31	2.13	191.6	235.2
July.....	63.8	61.6	88	76.8	38	50.8	1.74	.....	1.74	3.09	246.6	234.0
August.....	59.0	59.0	87	70.2	33	47.8	3.75	.....	3.75	3.15	162.8	201.4
September.....	49.9	50.6	82	61.1	20	38.7	5.16	.....	5.16	3.53	82.3	142.6
October.....	38.7	38.9	63	48.1	16	29.3	4.34	3.5	4.69	2.29	107.9	91.2
November.....	21.5	22.6	49	28.6	-16	14.5	0.74	15.0	2.24	2.13	33.2	45.7
December.....	4.1	6.8	30	13.5	-32	-5.4	.....	18.0	1.80	1.83	53.2	50.0
Year.....	32.2	32.2	88	43.2	-40	21.1	20.37	121.5	32.52	25.46	1,496.3	1,714.5

## ANIMAL HUSBANDRY

## DAIRY CATTLE

The dairy herd totals fifty-six head, consisting of thirty-three pure-bred Ayrshires and twenty-three grades.

The herd sire, Ottawa Supreme 46th —122068—, was born on October 18, 1928 and gives promise of developing into a very fine animal. He has been given class "A" standing in the Advanced Registry for pure-bred Ayrshire bulls. He is sired by Ottawa Supreme 20th —99327—, which is a class "AA" bull.

His dam is Ottawa Auchinbay Mina 2nd —86590—, a Canadian bred cow from an imported dam.

## MILK RECORDS

A record is kept of the milk produced by each cow during her entire lactation period. Each cow's milk is also tested once per month to determine the percentage of fat which it contains. The feed consumed by each for the time during which she was dry previous to freshening as well as during her lactation period is also recorded. From these data are calculated the amount of feed required per year to maintain each animal, the feed cost of maintenance and the feed cost of milk production.

The accompanying table shows the amount of milk produced by each cow that completed a lactation period during the calendar year of 1929, the cost of feed and the value of the milk produced. The profit column is really a comparison between the cost of the feed consumed and the value of the milk produced, as both the labour and the value of the calf are not included.

In estimating the cost of feed the following values were used:—

Ensilage, sunflowers, per ton.....	\$ 3 50
Ensilage, O.P.V. per ton.....	4 80
Roots, per ton.....	3 00
Hay, per ton.....	14 00
Meal, per 100 pounds.....	2 00
Pasture, per day.....	0 10

The hay and grain are valued at average local market prices, and the value of the silage is arrived at by assuming that 300 pounds of silage containing 25 per cent of dry matter is equal to 100 pounds of hay. On account of the O.P.V. silage containing a higher percentage of dry matter than the sunflower silage, it is given a higher value per ton.

The value of roots is arrived at in a similar manner except that the dry matter in roots is given a valuation of 15 per cent more than the dry matter in the silage. This makes 600 pounds of roots containing 10 per cent dry matter equal to 100 pounds of cured hay.

The actual cost of producing these different crops will be found in the Field Husbandry section of this report.

DAIRY CATTLE PRODUCTION

Name of cow	Age at beginning of lactation	Date of dropping calf	Number of days in lactation	Total pounds of milk for period	Daily average yield of milk	Average per cent fat in milk	Pounds of butter produced in period	Value of butter at 45 cents per pound		Value of skim-milk at 50 cents per 100 pounds		Total cost of feed		Feed cost to produce 100 pounds milk		Feed cost to produce 1 pound butter, skim-milk neglected	Profit on cow, labour and calf neglected
								lb.	¢	lb.	¢	lb.	¢	lb.	¢		
<b>Pure-bred Ayrshires—</b>																	
Blossom of Glenborough.....	12	Nov. 1, 1928	289-0	7,727-1	25-84	3-67	333-07	149-88	37-22	187-10	110-95	1-436	0-333	76-15			
Ess of Glenborough.....	12	Nov. 4, 1928	331-0	8,025-7	24-25	3-70	348-93	157-02	38-65	195-67	118-60	1-478	0-340	77-07			
Ste. Anne Malouin 2nd.....	4	Jan. 19, 1929	278-0	6,458-4	23-23	3-88	294-52	132-53	31-04	163-57	89-39	1-354	0-304	74-18			
Kap. Kyle Blossom.....	3	Aug. 13, 1928	379-0	8,669-8	22-88	3-87	395-14	177-81	41-67	219-48	121-94	1-406	0-309	97-54			
Brooklane Gladys.....	5	Jan. 7, 1929	309-0	8,212-2	26-58	4-45	429-66	193-35	39-23	232-58	123-62	1-505	0-288	108-96			
Brooklane White Beauty.....	2	Dec. 30, 1928	314-5	8,625-6	27-43	4-06	412-04	185-42	41-38	226-80	120-53	1-397	0-283	106-27			
Loonhurst Lulu Paisy.....	3	Jan. 20, 1929	328-5	7,780-1	23-68	4-07	372-78	167-75	37-32	205-07	116-48	1-497	0-312	88-59			
Fancy.....	5	Jan. 26, 1929	304-5	7,445-3	24-45	4-23	370-83	166-90	35-65	202-55	109-78	1-474	0-296	92-77			
<b>Grade Ayrshires—</b>																	
Bloomer A 1.....	6	Aug. 16, 1928	415-5	9,004-5	21-67	4-22	446-64	200-99	43-12	244-11	138-37	1-537	0-310	105-74			
Dewdrop C.....	4	Nov. 29, 1928	323-5	10,026-0	30-99	4-60	543-14	244-41	47-82	292-23	139-28	1-359	0-256	152-95			
Phoebe B 2.....	3	Nov. 18, 1928	331-5	5,077-9	15-22	3-91	233-35	105-01	24-40	129-41	101-99	2-009	0-437	27-42			
White C.....	2	Oct. 24, 1928	311-5	5,841-3	18-75	4-15	285-39	128-43	27-99	156-42	89-33	1-529	0-313	67-09			
Bloomer A 2.....	2	Dec. 9, 1928	354-0	6,373-1	18-02	4-18	313-53	141-09	30-56	171-65	99-32	1-557	0-317	72-33			
Bloomer A 3.....	2	Dec. 18, 1928	325-0	7,033-4	21-64	3-87	319-98	143-99	33-81	177-80	110-12	1-566	0-344	67-68			
Phoebe C.....	3	Jan. 31, 1929	328-0	9,381-1	28-60	3-83	422-98	190-34	45-11	235-45	117-01	1-247	0-277	118-44			
<b>Pure-bred Shorthorns—</b>																	
Kapuskasing Genevieve.....	3	Nov. 8, 1928	230-5	3,973-2	17-24	4-48	209-42	94-24	18-98	113-22	70-28	1-769	0-336	42-94			
Kapuskasing Prince Red Rose.....	3	May 2, 1928	182-5	3,125-5	17-13	3-99	146-79	66-06	15-00	81-06	58-14	1-860	0-396	22-92			
<b>Averages—</b>																	
Pure-bred Ayrshires.....			317-9	7,868-0	24-75	3-99	389-63	166-33	37-77	204-10	113-91	1-448	0-308	90-15			
Grade Ayrshires.....			341-3	7,534-6	22-08	4-13	365-43	164-89	36-12	201-01	113-63	1-508	0-310	87-3			
Pure-bred Shorthorns.....			206-5	3,549-4	17-19	4-27	178-11	80-15	16-99	97-14	64-21	1-809	0-361	32-9			

## SILAGE VERSUS NO SILAGE FOR MILK PRODUCTION

The object of this experiment was to determine the value of silage for milk production. For this test eight milking cows were selected which were in such stage of lactation that each would continue milking throughout the following four twenty-eight day periods which the experiment was to cover. The eight cows used consisted of four pure-bred and four grade Ayrshires. The experiment commenced on January 22, 1929.

During the first and third periods the ration consisted of 20 pounds of good quality clover hay and a grain ration as required; the actual quantity depending on the size and condition of each cow as well as the amount of milk she was giving. During periods two and four 8 pounds of the hay was replaced with 45 pounds of sunflower silage. This was the quantity required in order not to materially change the amount of dry matter in each ration. The grain mixture during periods one and three consisted of four parts each of bran, corn, and oats and one part of oil meal. During periods two and four the mixture was changed to bran four parts, oats three parts and oil meal 2 parts. This change was necessary in order not to alter the protein content and nutritive ratio of the two rations.

Seven days were taken to transfer from one ration to the other at the beginning of each period. The milk records are calculated on the last fourteen days in each twenty-eight day period, so that the cows are really one full week on the new ration before the milk yields are considered. The results are given in the following table:—

SILAGE VERSUS NO SILAGE FOR MILK PRODUCTION TEST  
(Average Results for Periods 1, 2, 3 and 4)

Items	Period 2 silage (sun- flowers)	Average periods 1 and 3, no silage	Period 3, no silage	Average periods 2 and 4, silage (sun- flowers)	Average results for silage (sun- flowers)	Average results for no silage
Number of cows in test..... No.	8	8	8	8	8	8
Pounds of milk produced by 8 cows First 7 days..... lb.	1,454.30	1,446.70	1,329.60	1,320.55	1,387.43	1,388.15
Pounds of milk produced by 8 cows Second 7 days..... "	1,413.20	1,436.95	1,315.40	1,295.70	1,354.45	1,376.18
Pounds of milk produced by 8 cows Third 7 days..... "	1,373.20	1,415.25	1,287.80	1,273.75	1,323.48	1,351.53
Pounds of milk produced by 8 cows Fourth 7 days..... "	1,340.50	1,365.35	1,233.90	1,250.25	1,295.37	1,299.62
Total pounds of milk produced by 8 cows in last 14 days..... "	2,773.70	2,780.60	2,521.70	2,524.00	2,618.85	2,651.15
Average milk per cow per day..... "	24.23	24.83	22.52	22.54	23.38	23.67
Average per cent fat in milk..... %	3.77	3.79	3.79	3.75	3.76	3.79
Pounds of fat produced by 8 cows in last 14 days..... lb.	102.43	105.37	95.55	94.66	98.55	100.46
Average pounds of fat per cow per day..... "	0.91	0.94	0.85	0.85	0.88	0.90
Meal consumed in 14 days..... "	1,050.00	1,050.00	1,050.00	1,050.00	1,050.00	1,050.00
Hay consumed in 14 days..... "	1,344.00	2,240.00	2,240.00	1,344.00	1,344.00	2,240.00
Silage (sunflowers) consumed in 14 days..... "	5,040.00	.....	.....	5,040.00	5,040.00	.....
Meal consumed per 100 pounds milk produced..... "	38.69	37.76	41.64	41.60	40.09	39.61
Hay consumed per 100 pounds milk produced..... "	49.53	80.56	88.83	53.25	51.32	84.49
Silage (sunflowers) consumed per 100 pounds milk produced..... "	185.72	.....	.....	199.68	192.45	.....
Meal consumed per 100 pounds fat produced..... "	1,025.09	996.49	1,098.90	1,109.23	1,065.45	1,045.19
Hay consumed per 100 pounds fat produced..... "	1,312.12	2,125.84	2,344.32	1,419.82	1,363.77	2,229.74
Silage (sunflowers) consumed per 100 pounds fat produced..... "	4,920.43	.....	.....	5,324.32	5,114.16	.....



SILAGE VERSUS NO SILAGE FOR MILK PRODUCTION TEST—*Concluded*  
 (Average Results for Periods 1, 2, 3 and 4)—*Concluded*

Item	Period 2 silage (sun- flowers)	Average periods 1 and 3, no silage	Period 3, no silage	Average periods 2 and 4, silage (sun- flowers)	Average results for silage (sun- flowers)	Average results for no silage
<i>Findings from Experiment—</i>						
Cost of meal mixture.....	\$ 21 00	22 05	22 05	21 00	21 00	22 05
Value of hay fed.....	\$ 9 41	15 68	15 68	9 41	9 41	15 68
Value of silage (sunflowers) fed	\$ 8 82	.....	.....	8 82	8 82	.....
Total cost of feed.....	\$ 39 23	37 73	37 73	39 23	39 23	37 73
Feed cost to produce 100 pounds of milk.....	\$ 1 45	1 36	1 50	1 55	1 50	1 42
Feed cost to produce 100 pounds of fat.....	\$ 38 30	35 81	39 59	41 44	39 81	37 56

DEDUCTIONS.—The figures in this table would seem to indicate that the feeding of silage does not increase the quantity nor reduce the cost of milk production. The silage used in this experiment was charged at \$3.50 per ton but the results show that it was actually worth only \$2.69 as compared with hay at \$14. It must be remembered, however, that definite conclusions should not be drawn from one year's work, and the experiment will accordingly be repeated for a number of years.

FEED COST OF REARING AYRSHIRE AND SHORTHORN CATTLE

A record is kept of the total feed consumed by all of the young stock from date of birth until the males are sold for breeding and the females have freshened. From these data it is possible to calculate the feed requirements at different ages and the feed cost of same. The average age of the Ayrshires at time of freshening is 2 years 6·8 months and the Shorthorn 2 years and 6 months. In the calculation of the costs, the skim-milk was charged at 50 cents per 100 pounds, the whole milk at \$2 per 100 pounds and the other feeds used at average farm market values.

The results in detail are presented in the following table:—

FEED COST OF REARING AYRSHIRE AND SHORTHORN CATTLE

—	Number of animals		Whole milk	Skim-milk	Meal	Hay	Straw	Silage	Roots	Pasture	Cost
	No.	lb.									
<i>Ayrshire females—</i>											
To 1 year.....	45	687	2,427	611	1,128	2	2,162	1	70		55 65
To 2 years.....	32	702	2,490	980	2,993	142	8,152	18	207		99 31
To freshening.....	26	665	2,449	1,341	4,451	312	12,068	210	297		130 15
<i>Ayrshire males—</i>											
To 6 months.....	20	839	1,925	275	449	.....	411	.....	.....	.....	36 29
To 1 year.....	5	810	2,685	1,074	1,873	.....	2,102	.....	4	.....	69 56
<i>Shorthorn females—</i>											
To 1 year.....	17	714	2,101	599	1,100	15	1,924	.....	79		58 81
To 2 years.....	12	748	2,170	1,013	3,000	134	7,079	.....	228		96 90
To freshening.....	9	757	2,077	1,228	4,485	178	11,782	89	295		127 18

BEEF CATTLE

On December 31 the herd of beef cattle totalled eleven head. Of this number ten are pure-bred Shorthorns and one is a grade Shorthorn.

The herd sire, Comet —176360—, was bred by Mr. Harry Hughes, of Balderson, Ontario. He is sired by Roan Comet —156602—, a bull with excellent breeding from the standpoint of milk production. His dam is Lady Belle —107521—, with a five-year-old record of 14,754 pounds of milk in 365 days.

## SHEEP

Pure-bred Shropshire is the breed of sheep kept at this Station. At the present time the breeding flock consists of twenty-seven ewes, twelve ewe lambs and two rams.

During the year, thirty-seven lambs were born. The average number of lambs born per ewe was 1.37, while the average over an eleven-year period is 1.54 and the average number raised is 1.22 for the year and 1.18 for the eleven-year period.

Sheep do very well in this climate. The greatest drawback is the danger of attack by dogs. At this Station it has been found necessary to put the entire flock in a dog-proof wire corral every night during the pasture season, and even with this precaution they have been severely mauled during the day on several occasions.

Each year a number of the best rams are sold to settlers for breeding purposes. The raising of sheep appears to be receiving more attention in this part of the province than was the case a few years ago.

## SWINE

Pure-bred Yorkshire is the breed of hogs kept at this Station. The herd of breeding stock on December 31 consisted of ten sows and one boar. The boar is Ottawa Lad 502 —139047—, a very good type of bacon hog. He is sired by Lakeside Bourne Boy 4 —107242—, which was bred by Charles G. Gregory. His dam is Ottawa Lass 405 —122306—, which was bred by the Director, Experimental Farms, Ottawa, and is from an imported sire.

## ADVANCE REGISTRY OF PURE-BRED SWINE

Four of the sows at this Station have been used in the collection of preliminary data to be employed in evolving a policy for the Advanced Registry of Pure-bred Swine.

In this test it is necessary to keep accurate records of the feed consumed by each litter as well as the gains made. In addition to this, a number of pigs from each litter must be subjected to a slaughter test and the carcasses graded.

The following table gives the detail of the test:—

KAPUSKASING ADVANCED REGISTRY—EXPERIMENT WITH PIGS, 1929

Items		Pigs from sow K.A. 678	Pigs from sow K.A. 856	Pigs from sow K.A. 916	Pigs from sow K.A. 917
Number of pigs.....	No.	5	5	5	5
Total weight at weaning.....	lb.	175	150	185	134
Average weight of each pig at weaning.....	"	35	30	37	26.8
Total weight at finish.....	"	1,032	1,108	1,079	925
Average weight of each pig at finish.....	"	206.4	221.6	215.8	185
Total gain.....	"	857	958	894	791
Average gain per pig.....	"	171.4	191.6	178.8	158.2
Total number of days fed.....	No.	709	744	747	843
Average number days per pig.....	"	141.8	148.8	149.4	168.6
Average gain per pig per day.....	lb.	1.21	1.29	1.20	0.94
Number of days per 100 pounds gain.....	No.	82.7	77.7	83.6	106.4
<b>Feed Consumed—</b>					
Total meal consumed.....	lb.	2,224	2,710	2,711	2,719
Total milk consumed.....	"	1,805	1,765	1,685	1,605
Total green feeds consumed.....	"	526	526	526	535
Meal consumed per pig per day.....	"	3.14	3.64	3.63	3.23
Milk consumed per pig per day.....	"	2.26	2.37	2.26	1.90
Green feeds consumed per pig per day.....	"	0.74	0.71	0.70	0.63
Pounds of meal per 100 pounds gain.....	"	259.5	282.9	303.2	343.7
Pounds of milk per 100 pounds gain.....	"	187.3	184.2	188.5	202.9
Pounds of green feed per 100 pounds gain.....	"	61.4	54.9	58.8	67.6
Total cost of feed.....	\$	56.40	68.70	68.08	67.47
Cost per 100 pounds gain.....	\$	6.58	7.17	7.62	8.53

## FEED COST OF MAINTAINING BROOD SOWS

A record is kept of the feed consumed by each sow during the year. A number of the sows spent a portion of the summer out on pasture and this is charged at the rate of 75 cents per month. The skim-milk used is charged at 50 cents per 100 pounds and the other feeds at local market prices.

The accompanying table shows the figures for 1928 as well as the average for a nine-year period:—

FEED COST OF MAINTAINING BROOD SOWS

Items		1929	Nine-year average 1921-29
Number of sows.....	No.	7	11
Total grain consumed.....	lb.	17,872	28,240
Average grain per sow.....	"	2,553	2,567
Average grain per sow per month.....	"	213	214
Total cost of feed.....	\$	410 05	580 97
Average cost of feed per sow.....	\$	58 58	51 00
Average cost of feed per sow per month.....	\$	4 88	4 25

## FEED COST OF REARING PIGS TO TIME OF WEANING

A record is kept of the feed consumed by each sow from the time one litter is weaned until the next litter is ready to wean. From these data the feed cost of maintaining the sow from weaning to farrowing and the feed cost of rearing the pigs to time of weaning may be calculated. The following table shows the figures for 1929 as well as the average for a six-year period:—

FEED COST OF REARING PIGS TO TIME OF WEANING

Items		1929	Six-year average, 1924-29
<i>From weaning to farrowing—</i>			
Number of sows.....	No.	13	18.3
Average length of period.....	days	142.0	177.0
Total grain consumed.....	lb.	10,216.0	20,549.0
Average grain per sow.....	"	785.8	1,122.9
Total cost of feed.....	\$	239 90	432 15
Average cost of feed per sow.....	\$	18 45	23 61
Total service fee.....	\$	20 00	36 66
Total cost.....	\$	265 90	468 81
Average cost per sow.....	\$	20 45	25 61
<i>From farrowing to weaning—</i>			
Number of sows.....	No.	12	17.8
Average length of period.....	day	57.3	56.8
Total grain consumed.....	lb.	6,608.0	11,690.0
Average grain per sow.....	"	550.7	656.7
Total cost of feed.....	\$	141 36	249 51
Average cost of feed per sow.....	\$	11 78	14 02
<i>Deductions—</i>			
Total number of pigs born.....	No.	112	188.8
Average number of pigs born per sow.....	"	8.6	10.3
Total number of pigs raised.....	"	80.0	141.0
Average number of pigs raised per sow.....	"	6.2	7.7
Total cost.....	\$	407 26	718 32
Total cost per sow.....	\$	32 23	59 68
Average cost per pig to time of weaning.....	\$	5 09	5 09

## COST OF PRODUCING PORK

In connection with the cost of pork production over a period of five years, both with spring and fall pigs, some interesting data have been accumulated.

In arriving at these costs the same prices have been used for feeds consumed as in the other work with swine, viz., skim-milk at 50 cents per 100 pounds and the other feeds at average market prices.

## COST OF PORK PRODUCTION

Items		Spring pigs	Fall pigs
Total number of pigs.....	No.	191	215
Total weight at finish.....	lb.	31,648.0	40,205.0
Average weight per pig.....	"	165.7	187.0
Total meal consumed.....	"	95,958.0	134,931.0
Total milk fed.....	"	15,831.0	24,312.0
Meal consumed per pig.....	"	502.4	627.6
Milk fed per pig.....	"	82.9	113.1
Meal consumed per 100 pounds weight.....	"	303.2	335.6
<i>Findings—</i>			
Total cost of pigs to time of weaning.....	\$	990 32	1,085 90
Total cost of feed.....	\$	2,096 81	3,220 39
Total cost.....	\$	3,087 13	4,306 29
Average cost per pig at time of weaning.....	\$	5 18	5 05
Cost of feed per pig.....	\$	10 98	14 98
Total cost per pig.....	\$	16 16	20 03
Cost per 100 pounds live weight.....	\$	9 75	10 71

## THE EFFECT OF SUPPLEMENTARY FEEDS IN FEEDING FALL PIGS DURING THE WINTER

Many farmers find it difficult to get satisfactory results from the feeding of fall pigs during the winter, even when the same ration that develops spring pigs successfully is supplied.

The object of this experiment is to compare the results obtained from each of the following supplementary feeds: (1) six per cent tankage, (2) six per cent tankage plus 3 per cent chopped alfalfa, (3) six per cent tankage plus alfalfa hay fed in racks, (4) six per cent tankage plus mangels, and (5) an 11 per cent increase in the oil meal plus 3 per cent chopped alfalfa but no tankage.

For this experiment, fifty pure-bred Yorkshire pigs ranging in age from 11 to 14 weeks were selected and weighed on December 1. These were divided equally into five lots of 10 pigs each. On account of the range in age between the individual pigs, it was thought advisable to sub-divide each lot into two pens, so that the pigs which would be together were more nearly equal in age and size. This also gave them more room. All lots were housed in the main hog-pen under similar conditions.

The basic meal ration was the same for each lot and during the first sixty days consisted of ground oats 2 parts and 1 part each of ground barley, shorts and middlings plus 3 per cent oil meal, and 2 per cent bone dust. After the first sixty days the meal ration was composed of 2 parts each of ground oats and barley, and 1 part of shorts plus 3 per cent oil meal and 2 per cent bone dust.

In calculating the cost of producing pork in this experiment the skim-milk was charged at 50 cents per 100 pounds and the other feeds at average market prices which are as follows:—

Ground oats.....	\$	2 08
Ground barley.....		2 49
Shorts.....		1 49
Middlings.....		1 78
Oil meal.....		3 02
Tankage.....		8 96
Bone dust.....		2 24
Alfalfa.....		1 00

And mangels 15 cents per 100 pounds.

## THE EFFECT OF SUPPLEMENTARY FEEDS IN FEEDING FALL PIGS DURING THE WINTER

Items	Lot 1, 6 per cent tankage	Lot 2, 6 per cent tankage plus 3 per cent chopped alfalfa	Lot 3, 6 per cent tankage plus alfalfa hay in racks	Lot 4, 6 per cent tankage plus mangels	Lot 5, oil meal increased to 14 per cent plus 3 per cent chopped alfalfa
Number of pigs in each lot..... No.	10	10	10	10	10
Total weight of 10 pigs..... lb.	503.0	500.0	482.0	512.0	488.0
Average weight of each pig..... "	50.3	50.0	48.2	51.2	48.8
Final weight of 10 pigs..... "	2,033.0	1,976.0	2,003.0	1,990.0	1,989.0
Average weight of each pig..... "	203.3	197.6	200.3	199.0	198.9
Total gain of each lot..... "	1,530.0	1,476.0	1,521.0	1,478.0	1,501.0
Average gain of each pig..... "	153.0	147.6	152.1	147.8	150.1
Average number of days fed per pig No.	140.6	139.0	135.0	134.4	162.2
Average daily gain per pig..... lb.	1.09	1.06	1.13	1.10	0.93
<i>Feed consumed—</i>					
Ground oats to each lot..... "	1,896.0	1,959.0	1,944.0	1,788.0	2,243.0

Items	Lot 1, 6 per cent tankage	Lot 2, 6 per cent tankage plus 3 per cent chopped alfalfa	Lot 3, 6 per cent tankage plus alfalfa hay in racks	Lot 4, 6 per cent tankage plus mangels	Lot 5, oil meal increased to 14 per cent plus 3 per cent chopped alfalfa
Ground barley to each lot..... lb.	1,646.0	1,738.0	1,694.0	1,538.0	2,042.0
Shorts to each lot..... "	947.0	978.0	972.0	894.0	1,122.0
Middlings to each lot..... "	250.0	222.0	250.0	250.0	200.0
Oil meal to each lot..... "	149.0	120.0	127.0	134.0	798.0
Tankage to each lot..... "	287.0	299.0	291.0	270.0	.....
Bone dust to each lot..... "	103.0	110.0	106.0	104.0	89.0
Alfalfa to each lot..... "	.....	169.0	1,340.0	.....	186.0
Mangels to each lot..... "	.....	.....	.....	1,584.0	.....
Total grain ration per lot (tankage included)..... "	5,278.0	5,426.0	5,384.0	4,978.0	6,494.0
Average grain ration per pig per day..... "	3.75	3.90	3.99	3.70	4.00
Average alfalfa per pig per day..... "	.....	0.12	0.99	.....	0.11
Average mangels per pig per day..... "	.....	.....	.....	1.18	.....
Amount of meal per 100 pounds gain..... "	345.0	367.6	354.0	336.8	432.6
Total cost of feed per lot..... \$	117.27	122.27	132.79	112.81	145.82
Cost of feed to produce 100 pounds gain..... \$	7.66	8.28	8.73	7.63	9.71

DEDUCTIONS.—Comparing lots 1 and 2 it is found that lot 1 has given a little the better gains and at a lower cost per 100 pounds, the difference in cost being 62 cents.

The alfalfa as fed to lot 3 in racks has given slightly larger gains than when chopped and mixed in the meal as fed to lot 2; but the cost per 100 pounds gain has also been increased owing to the greater amount of alfalfa fed. It is possible, however, that a portion of the alfalfa fed from the racks would be pulled out and thereby wasted.

Lot 4, which received mangels in place of alfalfa, has made almost as large gains as lot 3 and slightly larger than lots 1 and 2 and the cost per 100 pounds is the lowest of all.

With lot 6 where the animal protein as furnished in the tankage was replaced with vegetable protein by increasing the oil meal from 3 to 14 per cent, it is found that a noticeable reduction in the rate of gain occurred; this resulted in a larger consumption of meal per 100 pounds gain and also increased the final cost per 100 pounds gain.

### HORSES

At the present time nineteen horses are kept at this Station. Fourteen of these are heavy work horses. Four are pure-bred French Canadians, two mares, one three-year-old colt and one suckling colt, and one is a driving horse.

Records are kept of the feed consumed and the number of hours of work performed by each horse. From these data are calculated the feed cost of maintenance and the feed cost of horse labour per hour.

In arriving at these figures the hay was charged at local farm prices, that is, the amount it would sell for on the farm without being pressed or hauled. The grain was charged at local market prices. The results in detail are presented in the following table:—

FEED COST OF MAINTENANCE AND HORSE LABOUR

Items		1929	Seven-year average
Average number of horses fed.....	No.	16.8	15.1
Total hours worked.....	"	44,159	40,022
Average hours per horse.....	"	2,629	2,650
Average hours per horse per day.....	"	8.8	8.8
Total hay fed.....	lb.	120,377	106,220
Total grain fed.....	"	95,546	86,250
Total days on pasture.....	No.	122	54
Average hay per horse.....	lb.	7,165	7,034
Average grain per horse.....	"	5,687	5,712
Average days on pasture per horse.....	No.	7.2	3.6
Average hay per horse per day.....	lb.	19.7	19.2
Average grain per horse per day.....	"	15.6	15.6
<i>Findings—</i>			
Cost of hay consumed.....	\$	842 64	757 16
Cost of grain consumed.....	\$	1,987 36	1,765 88
Cost of pasture.....	\$	12 20	5 40
Total cost of feed.....	\$	2,842 20	2,528 44
Average cost of feed per horse.....	\$	169 18	167 45
Average cost of horse labour per hour.....	cts.	6.4	6.3

### FIELD HUSBANDRY

#### ROTATION OF CROPS

In order to obtain some definite information in regard to the most practical and suitable rotations to use in Northern Ontario, an experiment in crop rotations was established in 1922. In this experiment one acre is included for each year that the rotation covers, making three acres for a three-year rotation, four acres in a four-year rotation, and so on. The area on which these rotations are established is a clay-loam soil which is apparently fairly uniform, although a few narrow strips of shallow muck are present. These are running crosswise of the rotations, however, and therefore should not materially affect the accuracy of the test.

In arriving at the cost of production figures, a record is kept of all items involved and a value is set on all products produced. These form a basis by

which to compare the rotations. In determining these costs, actual prices are used wherever possible, such as the cost of labour, seed, twine, etc.

The rent of the land is arrived at by multiplying the value of the land by the current rate of interest, on first mortgage plus taxes. The charge for machinery includes interest on investment, depreciation charges and a percentage for repairs. The cost of horse labour is calculated on the basis of the cost of maintenance for one year divided by the number of hours' work done.

The return values are based on the current marked prices under local conditions for all crops that are saleable. For the silage and root crops, it is assumed that 300 pounds of ensilage containing 25 per cent dry matter and 600 pounds of roots containing 10 per cent dry matter are each equal to 100 pounds of cured hay.

The prices and return values used in the 1929 report are as follows:—

PRICES USED IN FIGURING COST OF PRODUCING CROPS

<i>Expenses—</i>		
Rent.....	per acre	\$ 4 75
Use of machinery.....	per acre	2 85
Manure.....	per ton	1 50
Nitrate of soda.....	per ton	69 00
Superphosphate.....	per ton	30 00
Muriate of potash.....	per ton	64 80
Threshing (oats, barley).....	per bushel	0 07
Threshing (wheat).....	per bushel	0 15
Ensilage.....	per ton	0 71
Manual labour.....	per hour	0 35
Teamsters.....	per hour	0 36
Horse labour (single).....	per hour	0 10
Tractor and operator.....	per hour	1 10
Potatoes.....	per bushel	1 55
Turnip seed.....	per pound	0 70
Barley.....	per bushel	2 43
Wheat (spring).....	per bushel	2 50
Oats.....	per bushel	1 90
Peas.....	per bushel	2 60
Vetch.....	per bushel	5 64
Sunflower seed.....	per pound	0 13
Corn.....	per pound	0 08
Timothy.....	per pound	0 12
Red clover.....	per pound	0 31
Alsike.....	per pound	0 28
Alfalfa.....	per pound	0 57
Sweet clover.....	per pound	0 11
Twine.....	per pound	0 15
<i>Return Values—</i>		
Peas.....	per bushel	2 00
Barley.....	per bushel	1 10
Wheat.....	per bushel	1 50
Oats.....	per bushel	0 90
Potatoes (marketable).....	per bushel	1 40
Potatoes (unmarketable).....	per ton	1 75
Hay.....	per ton	15 00
Straw (barley, oats).....	per ton	6 00
Straw (wheat).....	per ton	3 00
Sunflower silage.....	per ton	3 61
O.P.V. silage.....	per ton	4 88
Corn silage.....	per ton	3 61
Turnips.....	per ton	1 75

Following is a brief description of each rotation under test with the results obtained to date:—

ROTATION A (THREE YEARS' DURATION)

Sunflowers, oats and clover hay are included. The clover sod is manured at the rate of 12 tons per acre and fall-ploughed for sunflowers. After the sunflowers are harvested the land is again fall-ploughed in preparation for seeding to grass and clover, using oats as a nurse-crop. The results in 1929 from the different crops are as follows:—

## ROTATION A (THREE YEARS' DURATION)—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Value of crop 1929	Cost of production	Profit or loss per acre	
		1929	Average 4 years			1929	Average 4 years
				\$	\$	\$	\$
1	Sunflowers..... ton	12.58	9.17	45 41	42 80	2 61	-11 66
2	Oats (straw)..... "	0.71	0.69				
	(Alaska) (grain)..... bush.	35.4	27.8	36 12	28 72	7 40	-4 94
3	Clover hay..... ton	1.84	1.58	27 60	19 99	7 61	2 09
	Average per acre.....			36 38	30 50	5 88	-4 84

## ROTATION B (FOUR YEARS' DURATION)

Sunflowers, oats, clover hay and timothy hay are included. The timothy sod is manured at the rate of 16 tons per acre and fall-ploughed for sunflowers. After the sunflowers are harvested the land is again fall-ploughed for oats, which are used as the nurse-crop for the grass and clover seed. The results in 1929 from the different crops are as follows:—

## ROTATION B (FOUR YEARS' DURATION)—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Value of crop 1929	Cost of production	Profit or loss per acre	
		1929	Average 5 years			1929	Average 5 years
				\$	\$	\$	\$
1	Sunflowers..... ton	15.34	10.56	55 38	47 29	8 09	-9 42
2	Oats (straw)..... "	0.58	0.65				
	(Alaska) (grain)..... bush.	28.5	27.8	29 13	30 04	-0 91	-7 97
3	Clover hay..... ton	1.71	1.54	25 65	19 17	6 48	1 97
4	Timothy hay..... "	1.92	1.58	28 80	14 47	14 33	6 71
	Average per acre.....			34 74	27 74	7 00	-2 18

## ROTATION C (FIVE YEARS' DURATION)

Oats, sunflowers, barley, clover hay and timothy hay are included. The timothy sod is fall-ploughed for oats. The oat stubble is manured at the rate of 12 tons per acre and fall-ploughed for sunflowers. After the sunflowers are harvested, the land is again fall-ploughed for barley which is the nurse-crop for the grass and clover. After the clover hay is cut, a top dressing of manure is applied at the rate of 8 tons per acre. The results in 1929 from the different crops are as follows:—

## ROTATION C (FIVE YEARS' DURATION)—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Value of crop 1929	Cost of production	Profit or loss per acre	
		1929	Average 5 years			1929	Average 5 years
				\$	\$	\$	\$
1	Oats (straw)..... ton	0.67	0.89				
	(Alaska) (grain)..... bush.	30.9	37.0	31 83	28 74	3 09	1 74
	Sunflowers..... ton	15.11	11.11	64 55	43 72	10 83	-5 59
	Barley (straw)..... "	0.71	0.75				
	(grain)..... bush.	37.6	29.9	45 62	29 51	16 11	3 61
	Clover hay..... ton	1.62	1.47	24 30	17 70	6 60	2 18
	Timothy hay..... "	2.22	1.75	33 30	18 95	14 35	3 77
	Average per acre.....			37 92	27 73	10 19	1 14



## ROTATION D (SIX YEARS' DURATION)

This rotation includes potatoes, wheat, barley, clover hay and timothy hay for two years. The timothy sod is manured at the rate of 16 tons per acre and fall-ploughed for potatoes. After the potatoes are dug, the land is again fall-ploughed for wheat, and is also fall-ploughed for barley, which is the nurse-crop for seeding out with. The new seeding is given a top dressing of manure at the rate of 8 tons per acre after the barley is harvested. The results in 1929 from the different crops are as follows:—

ROTATION D (SIX YEARS' DURATION)—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Value of crop 1929	Cost of production	Profit or loss per acre	
		1929	Average 5 years			1929	Average 5 years
				\$	\$	\$	\$
1	Potatoes (unmarketable)..... ton	0.42	0.38				
	(marketable)..... bush.	135.5	125.33	190.44	76.91	113.53	61.62
2	Wheat (straw)..... ton	0.77	1.13				
	(Garnet) (grain)..... bush.	20.5	19.6	33.06	30.38	2.68	-0.20
3	Barley (straw)..... ton	0.79	0.79				
	(grain)..... bush.	30.0	26.8	37.74	28.23	9.51	2.38
4	Clover hay..... ton	1.83	1.55	27.45	20.69	6.76	0.33
5	Timothy hay..... ton	1.73	1.59	26.70	15.39	11.31	5.29
6	Timothy hay..... ton	2.33	1.50	34.95	14.50	20.45	6.42
	Average per acre.....			58.39	31.01	27.38	12.64

## ROTATION E (FIVE YEARS' DURATION)

Oats, summer-fallow, fall wheat, clover hay and timothy hay were included in this rotation. For some reason, however, the fall wheat was a complete or partial failure almost every year and consequently it was thought advisable to supersede this rotation by a new rotation which will be designated F. This new rotation includes oats, barley, and mixed hay for three years.

The sod is fall-ploughed for the oat crop. After the oat crop is harvested the land is again fall-ploughed in preparation for barley which is used as the nurse-crop for seeding out with at the following rate per acre: alfalfa 10; red clover 5; alsike clover 2 and timothy 3 pounds. Manure is disked in at the rate of ten tons per acre for the barley and another application of ten tons is applied as a topdressing after the first year meadow is harvested. As this new rotation has been in operation for a period of only one year there are no results to publish at present.

## COST OF PRODUCING FARM CROPS

Records are kept on the cost of production for the various field crops grown. The figures which follow are in some cases from field areas which were not included in the rotations, while in other cases they represent an average of field areas and rotations.

## COST OF PRODUCING SPRING WHEAT (GARNET)

The figures used in determining the cost of producing spring wheat represent one acre which was grown in the six-year rotation and 2.5 acres under ordinary field crop. The 2.5 acres were seeded on May 2, and the other acre on May 14, at the rate of 2 bushels per acre. The germination was good and a nice stand

developed. The 2.5 acres were harvested on September 12 and the one acre on September 17. The cost of production is as follows:—

Total cost per acre.....		\$26 95
Yield of grain per acre.....	bush.	23.3
Yield of straw per acre.....	ton	0.81
Value of crop per acre.....		\$37 40
Profit per acre.....		10 45
Cost per bushel.....		1 08
Cost per ton of straw.....		2 16

#### COST OF PRODUCING ALASKA OATS

The area in Alaska oats included 69.9 acres, 4 of which were in the rotations, 5 in the cultural experiments, and 60.9 in the regular field crop area. These were seeded from May 27 to June 13, at the rate of 2½ bushels per acre. Although the seeding was done unusually late, the Alaska being an early variety the grain matured very well and was harvested from September 12 to 25. The quality of the grain was good. The cost of production is as follows:—

Total cost per acre.....		\$23 75
Yield of grain per acre.....	bush.	27.5
Yield of straw per acre.....	ton	0.44
Value of crop per acre.....		\$27 39
Profit per acre.....		3 64
Cost per bushel.....		0 78
Cost per ton of straw.....		5 20

#### COST OF PRODUCING BARLEY

The figures on the cost of producing barley are based on 31.3 acres, 10 of which were grown in the rotations and cultural experiments. The seed was sown from June 1 to 8, at the rate of 2 bushels per acre. O.A.C. No. 21 was the variety used. The crop was harvested from September 17 to 23. The cost of production is as follows:—

Total cost per acre.....		\$27 66
Yield of grain per acre.....	bush.	27.4
Yield of straw per acre.....		0.63
Value of crop per acre.....		\$33 92
Profit per acre.....		6 26
Cost per bushel.....		0 90
Cost per ton of straw.....		4 90

#### COST OF PRODUCING HAY

The standard hay mixture used is red clover 8 pounds, timothy 8 pounds, and alsike 2 pounds per acre. As the first-year meadow is usually largely red clover the cost of the red clover seed is charged against the first hay crop, and the cost of the alsike clover and timothy seed is equally distributed among all of the hay years in the rotation.

The cost of production figures for hay include 33 acres in the rotations and cultural experiments, and 118.5 acres in the field areas. Haying commenced on July 25 and the cutting was completed on August 8. The cost of production is as follows:—

Total cost per acre.....		\$ 14 01
Yield per acre.....	ton	1.15
Value per acre.....		\$17 25
Profit per acre.....		3 24
Cost per ton.....		12 17

#### COST OF PRODUCING SUNFLOWERS

The figures on the cost of producing sunflowers are based on 19.6 acres, 4 of which were grown on the rotations and cultural experiments. The seed was planted from May 14 to June 8, in rows 36 inches apart. The germination was

good, but the yield was only fair. The crop was harvested from September 23 to 26. The cost of production is as follows:—

Total cost per acre.....	\$34 47
Yield per acre..... ton	5 84
Value per acre.....	\$21 08
Loss per acre.....	13 39
Cost per ton.....	5 90

#### COST OF PRODUCING OATS, PEAS AND VETCH MIXTURES

The area from which these figures have been obtained includes one acre in the rotations and 37·8 acres under field crop. Only one acre received manure; 21·8 acres were on night pasture and the remainder was on new land. The seed was sown from June 4 to 14, and the crop was harvested and ensiled from September 9 to 16. The cost of production is as follows:—

Total cost per acre.....	\$30 25
Yield per acre..... ton	2 44
Value per acre.....	\$11 91
Loss per acre.....	18 34
Cost per ton.....	12 40

#### COST OF PRODUCING POTATOES

The 3·3 acres of potatoes from which these figures are obtained include one acre in the six-year rotation and 2·3 acres under field crop. The one acre was manured at the rate of 16 tons to the acre previous to fall-ploughing and the remainder was alfalfa sod which had been used as a poultry run.

The seed was planted from May 29 to June 3, and the crop was harvested from October 1 to 4. The cost of production is as follows:—

Total cost per acre.....	\$ 74 45
Yield of marketable potatoes..... bush.	194 9
Yield of unmarketable potatoes..... ton	0 59
Value of crop per acre.....	\$273 84
Profit per acre.....	199 39
Cost per bushel of marketable potatoes.....	0 38
Cost per ton of unmarketable potatoes.....	0 48

### CULTURAL EXPERIMENTS

#### DATE OF SEEDING FALL WHEAT

The object of this experiment is to determine what date or dates of seeding will give the best results. In 1928 the seed was sown on 6 different dates at intervals of seven days, commencing on August 18, in quadruplicate one-fortieth-acre plots, at the rate of 2 bushels per acre. Kharkov was the variety used. The results are as follows:—

#### DATE OF SEEDING FALL WHEAT

	Date sown					
	Aug. 18	Aug. 25	Sept. 1	Sept. 8	Sept. 15	Sept. 22
	bush. lb.	bush. lb.	bush. lb.	bush. lb.	bush. lb.	bush. lb.
Yield per acre.....	4 50	4 40	2 27	2 20	2 13	4 0

#### DATE OF SEEDING FALL RYE

The object of this experiment is to determine what date or dates of seeding will give the best results. In 1928 the seed was sown on six different dates at intervals of seven days commencing on August 18, in quadruplicate one-fortieth-acre plots at the rate of 1½ bushels per acre. Common fall rye was the variety used. The results are as follows:—

## DATE OF SEEDING FALL RYE

	Date sown											
	Aug. 18		Aug. 25		Sept. 1		Sept. 8		Sept. 15		Sept. 22	
	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.
Yield per acre.....	18	12	19	46	15	20	10	40	2	8	2	48

## RATE OF SEEDING SUNFLOWERS

The object of this experiment is to determine the rate of seeding which will give the largest yield and be the most satisfactory generally. In 1929 twelve different rates were under test. The seed was sown on June 15, in quadruplicate one-fortieth-acre plots on fall-ploughed clay-loam soil which was manured at the rate of 16 tons per acre for the previous crop. The seed germinated well but owing to the unusually late seeding only a fair yield was obtained. The results are as follows:—

## RATE OF SEEDING SUNFLOWERS

Distance between rows	Distance between plants in row	Area occupied by each plant	Yield per acre							
			Green weight 1929		Dry weight 1929		Average green weight 1924-29		Average dry weight 1924-29	
			ton	lb.	ton	lb.	ton	lb.	ton	lb.
24.....	6	1.0	6	1,660	1	247	13	1,171	1	1,794
24.....	12	2.0	6	1,020	1	207	12	973	1	1,320
24.....	18	3.0	4	1,300	0	1,428	10	1,702	1	877
30.....	6	1.25	6	680	0	1,815	13	1,438	1	1,551
30.....	12	2.50	6	60	0	1,928	12	356	1	1,133
30.....	18	3.75	5	1,320	0	1,850	11	304	1	952
36.....	6	1.50	5	1,760	1	54	13	996	1	1,383
36.....	12	3.00	5	1,760	0	1,928	12	838	1	1,192
36.....	18	4.50	3	1,680	0	1,301	10	1,457	1	857
42.....	6	1.75	5	1,200	0	1,808	13	418	1	1,436
42.....	12	3.50	5	920	0	1,772	11	563	1	945
42.....	18	5.25	4	600	0	1,201	9	1,466	1	402

The figures in this table would seem to indicate that the yield of sunflowers may be affected more by changing the distance between the plants in the row than by changing the distance between the rows.

It may be noticed in the average results of dry weight per acre over a six-year period that in every instance where the spacing of the plants in the row has been changed from 6 to 12 and 18 inches there has been a noticeable decrease in the yield; while on the other hand the decrease in the yield has not been so marked where the rows are widened from 24 to 30, 36 and 42 inches apart.

In order to make possible a more direct comparison between the average results from the rows different distances apart and also the plants at different distances within the row, the following table has been prepared:—

## RATE OF SEEDING SUNFLOWERS. ROWS AND PLANTS AT DIFFERENT DISTANCES APART

Distance	Yield per acre							
	Green weight 1929		Dry weight 1929		Average green weight 1924-29		Average dry weight 1924-29	
	ton	lb.	ton	lb.	ton	lb.	ton	lb.
Rows 24 inches apart.....	5	1,993	0	1,961	12	615	1	1,330
Rows 30 inches apart.....	6	20	0	1,864	12	699	1	1,212
Rows 36 inches apart.....	5	400	0	1,761	12	430	1	1,144
Rows 42 inches apart.....	5	240	0	1,594	11	816	1	928
Plants 6 inches apart.....	6	325	0	1,981	13	1,006	1	1,541
Plants 12 inches apart.....	5	1,940	0	1,959	12	183	1	1,148
Plants 18 inches apart.....	4	1,225	0	1,445	10	1,232	1	772

This table also brings out the greater tendency for the yields to lessen, as the plants are more widely spaced within the row, than where the rows are spaced at greater width.

While 24 inches between the rows has given the largest yield, this is not sufficient width to permit of convenient cultivation and harvesting, and 42 inches seems unnecessarily wide with a tendency to give coarse stalks and lower yields. A distance of 30 to 36 inches, with the plants around 6 inches apart in the row should prove a suitable spacing to use under ordinary farm conditions.

#### RATE OF SEEDING ENSILAGE CROPS

The object of this experiment is to compare the yield and quality of ensilage crops produced from various rates of seeding, using sunflowers, corn and different mixtures of oats, peas and vetch.

In 1929, twenty different mixtures and rates of seeding were under test. These were all seeded in quadruplicate one-fortieth-acre plots on fall-ploughed clay-loam soil which had been manured at the rate of 16 tons per acre previous to ploughing. The O.P.V. was seeded on June 10, and the corn and sunflowers on June 12. The corn was harvested on September 18, the O.P.V. on September 25, and the sunflowers on October 1. Mammoth Russian sunflowers, North Western Dent corn, O.A.C. No. 72 oats, Mackay peas and Common vetch are the varieties used. The germination of all three crops was very good and although the seeding was unusually late very fair yields were obtained. The results are as follows:—

DISTANCE BETWEEN ROWS AND RATE OF SEEDING ENSILAGE CROPS

Crops and rate						Yield per acre							
Sun- flowers	Corn	Oats	Peas	Vetch	Clover	Green weight 1929		Dry weight 1929		Average green weight 1924-29		Average dry weight 1924-29	
						ton	lb.	ton	lb.	ton	lb.	ton	lb.
24						11	1,520	1	1,075	16	782	2	55
30						12	960	1	1,531	15	1,780	1	1,883
36						11	1,440	1	1,501	14	1,902	1	1,846
42						9	870	1	823	12	1,561	1	1,196
	24					6	560	0	1,615	4	1,468	0	1,124
	30					6	150	0	1,559	4	978	0	1,080
	36					5	870	0	1,417	3	1,636	0	940
	42					4	950	0	1,091	3	253	0	745
		34	60			9	720	2	522	9	1,910	2	767
		51	60			8	1,400	2	695	9	1,837	2	890
		68	60			8	640	2	737	9	1,665	2	1,036
		34	60	28		12	520	2	1,645	11	741	2	1,019
		51	60	28		12	300	2	1,608	11	1,421	2	1,333
		68	60	28		11	810	2	1,368	11	686	2	1,157
		34	60		10	9	1,410	2	883	10	538	2	906
		51	60		10	9	880	2	832	10	398	2	939
		68	60		10	9	1,420	2	1,133	9	1,862	2	1,027
		34	60	28	10	12	990	2	1,508	11	294	2	890
		51	60	28	10	11	1,200	2	1,464	11	490	2	1,120
		68	60	28	10	10	1,960	2	1,544	10	1,873	2	1,203

The average figures in this table show that the largest yield has been obtained from rows 24 inches apart and the smallest yield from rows 42 inches apart with both sunflowers and corn. However, 24 inches apart has been found to be an inconvenient distance for cultivating and harvesting, consequently, either 30 or 36 inches is to be recommended in preference to either of the other two.

In order to make possible a more direct comparison between the different rates of seeding the O.P.V. the following table has been prepared:—

## AVERAGE OF THE DIFFERENT RATES OF O.P.V.

Plots averaged	Yield per acre			
	Average green weight 1924-29		Average dry weight 1924-29	
	ton	lb.	ton	lb.
Where 34 pounds of oats are included (4 plots).....	10	1,371	2	896
Where 51 pounds of oats are included (4 plots).....	10	1,536	2	1,071
Where 68 pounds of oats are included (4 plots).....	10	1,022	2	1,106
Where oats and peas are sown (3 plots).....	9	1,804	2	898
Where oats, peas and vetch are sown (3 plots).....	11	940	2	1,170
Where oats, peas and clover are sown (3 plots).....	10	266	2	958
Where oats, peas, vetch and clover are sown (3 plots).....	11	219	2	1,071

The figures in this table indicate that there is some tendency for the yield to increase as the amount of oats included in the mixture has been increased.

The figures also show some advantage where vetch is present, but the addition of the clover has not materially affected the yield.

It is worthy of note the very excellent yields that have been obtained, even with what might be considered as a rather light seeding of oats and peas.

## DATE OF SEEDING ENSILAGE CROPS

The object of this experiment is to determine the best date or dates on which to seed the different ensilage crops, using sunflowers, corn and a mixture of oats, peas and vetch. The sunflowers and corn are sown in drills 30 inches apart and the sunflowers are thinned 6 to 12 inches apart in the row, while the oats, peas and vetch are sown at the rate of 2 bushels of oats, 1 bushel of peas and  $\frac{1}{2}$  bushel of vetch per acre. Mammoth Russian sunflowers, Quebec 28 corn, O.A.C. No. 72 oats, Mackay peas and common vetch are the varieties used.

In 1929, the seed was sown on six different dates at intervals of seven days commencing on June 11, on fall-ploughed clay-loam soil which was manured at the rate of 16 tons per acre previous to ploughing. The sunflowers and O.P.V. were seeded in quadruplicate one-fortieth-acre plots and the corn in one-eighth-acre plots. The results to date are as follows:—

## DATE OF SEEDING ENSILAGE CROPS

Crop	Date of seeding 1929	Yield per acre							
		Green weight 1929		Dry weight 1929		Average green weight 1924-29		Average dry weight 1924-29	
		ton	lb.	ton	lb.	ton	lb.	ton	lb.
Sunflowers.....	June 11	16	900	2	1,014	19	336	2	1,165
Sunflowers.....	June 18	14	660	2	466	18	192	2	591
Sunflowers.....	June 25	12	1,680	1	973	17	1,022	2	303
Sunflowers.....	July 2	9	870	1	377	15	1,420	1	1,581
Sunflowers.....	July 9	4	1,750	0	1,186	13	1,557	1	1,180
Sunflowers.....	July 16	3	340	0	817	11	337	1	491
O.P.V.....	June 11	14	340	3	180	12	507	2	1,821
O.P.V.....	June 18	13	790	2	1,087	12	940	2	1,611
O.P.V.....	June 25	13	1,020	2	923	12	907	2	1,161
O.P.V.....	July 2	13	1,570	2	628	12	548	2	728
O.P.V.....	July 9	13	1,600	2	313	12	535	2	326
O.P.V.....	July 16	11	1,960	1	1,905	11	1,343	2	307
*Corn.....	June 11	10	240	1	462	6	1,284	0	1,675
Corn.....	June 18	7	1,760	0	1,845	5	1,402	0	1,423
Corn.....	June 25	4	700	0	1,046	5	1,350	0	1,374
Corn.....	July 2	3	140	0	741	5	176	0	1,233
Corn.....	July 9	1	580	0	309	3	1,496	0	881
Corn.....	July 16	0	1,100	0	160	2	1,336	0	663

\* The corn in this experiment failed to germinate in 1927 and consequently the average figures for this crop are for a five-year period.

The figures in this table indicate that there is a general tendency for the earlier seedings of sunflowers, corn and O.P.V. to give the better results. In fact over a six-year period the first seeding has given the largest yield. In this connection, however, it is interesting to note that the O.P.V. may be seeded until quite late and still give fairly good results. This may sometimes prove a convenience, particularly on an area of low-lying land which may be slow in drying up in the spring.

## GREEN MANURE EXPERIMENTS

### PLOUGHING DOWN SWEET CLOVER AND SUMMER-FALLOWING

The object of this experiment is to determine the value, if any, of sweet clover as a green manure when used in conjunction with a summer-fallow. This experiment was commenced in 1922 on virgin clay-loam soil, which had never received any fertilizer of any kind. It is operated on a five-year rotation including oats, sweet clover, barley, clover hay, and timothy hay. The land is fall-ploughed for the oat crop. When the sweet clover has attained a fair growth it is ploughed under, and the land is cultivated occasionally throughout the remainder of the season. The results from the different crops are as follows:—

PLOUGHING DOWN SWEET CLOVER AND SUMMER-FALLOWING—RESULTS IN 1929

Rotation year	Crops and treatment	Yield per acre		Cost of summer-fallowing, 1929	Value of crop minus cost of summer-fallowing	
		1929	Average 5 years		1929	Average 5 years
				\$	\$	\$
1	Oats (Alaska) straw..... ton	0.67	0.61			
	grain..... bush.	20.6	21.9		22 56	19 39
2	Sweet clover ploughed down and summer-fallowed.....					
3	Barley straw..... ton	0.52	0.77			
	grain..... bush.	22.7	22.0	11 73	16 36	18 08
4	Clover hay..... ton	1.04	1.01	5 87	9 73	10 56
5	Timothy hay..... ton	0.88	1.03		13 20	14 51
	Average per acre.....			3 52	12 37	12 61

### PLOUGHING DOWN SWEET CLOVER AND ADDING COMMERCIAL FERTILIZER

The original objects of this experiment were to determine the respective value, if any, of sweet clover ploughed under and the practice of using an additional crop of buckwheat, one-half acre of which was also ploughed under and one-half acre harvested for grain. It was found in actual practice, however, that the buckwheat rarely matured before being frosted and consequently it was decided to discontinue this part of the experiment and add commercial fertilizers. It is to be operated on a five-year rotation, including oats, sweet clover, barley, clover hay and timothy hay. The land is fall-ploughed for the oat crop. When the sweet clover has attained a fair growth it is ploughed under, and the land is cultivated occasionally throughout the remainder of the season in preparation for barley the next year which is the nurse-crop for the grass and clover. The fertilizers are applied as follows: barley, nitrate of soda 100, and superphosphate 300 pounds per acre; clover hay, nitrate of soda 100, and muriate of potash 75 pounds per acre; timothy, nitrate of soda 100 pounds per acre.

As this new rotation has not yet completed one full cycle no figures are available for publication.

#### NO GREEN MANURE CROP PLOUGHED DOWN

In this experiment no green manure crop is ploughed down, but a legume grain is introduced to supplement the clover crop in building up the soil. It was commenced in 1922 under a four-year rotation, including peas, oats, clover hay and timothy hay. In 1927, however, it was decided to replace the oat crop by barley in order to make possible a more direct comparison between this and the other experiments. The timothy sod is fall-ploughed for peas. After the pea crop is harvested, the land is again fall-ploughed in preparation for seeding to grass and clover using barley as a nurse-crop. The results from the different crops are as follows:—

#### NO GREEN MANURE CROP PLOUGHED DOWN—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Value of crop	
		1929	Average 3 years	1929	Average 3 years
				\$	\$
1	Peas/straw..... ton	0.25	0.54		
	{ grain..... bush.	9.0	14.1	19 50	41 21
2	Barley/straw..... ton	0.33	0.65		
	{ grain..... bush.	15.2	19.8	18 70	24 71
3	Clover hay..... ton	0.39	0.48	5 85	7 27
4	Timothy hay..... ton	0.73	0.75	10 95	11 49
	Average per acre.....			13 75	21 17

#### EFFECT OF GROWING NON-LEGUMES

The object of this experiment is to use it as a check or base with which to compare the other experiments. It was commenced in 1922 under a four-year rotation, including oats, barley, clover hay and timothy hay. The timothy sod is fall-ploughed for the oat crop. After harvest the land is again fall-ploughed in preparation for barley which is the nurse-crop for the grass and clover. The results from the different crops are as follows:—

#### EFFECT OF GROWING NON-LEGUMES—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Value of crop	
		1929	Average 5 years	1929	Average 5 years
				\$	\$
1	Oats (Alaska)/straw..... ton	0.39	0.49		
	{ grain..... bush.	25.9	24.4	25 65	21 11
2	Barley/straw..... ton	0.34	0.39		
	{ grain..... bush.	17.1	14.7	20 85	17 20
3	Clover hay..... ton	0.89	1.00	13 35	14 15
4	Timothy hay..... ton	0.81	0.89	12 15	12 78
	Average per acre.....			18 00	16 31

#### FARM MANURE EXPERIMENT

The object of this experiment is to compare the effect of manure applied in two applications, 8 tons disked in for barley and 8 tons applied on the clover stubble for timothy, with green manure ploughed down; with green manure and fertilizers; with fertilizers alone and with no manure of any kind. This experiment was commenced in 1922 under a four-year rotation including oats, barley, clover hay and timothy hay. The land is fall-ploughed for oats. After the



oats are harvested, it is again fall-ploughed and seeded out to grass and clover the next spring using barley as a nurse-crop. The results from the different crops are as follows:—

FARM MANURE EXPERIMENT—RESULTS IN 1929

Rotation year	Crop	Yield per acre		Cost of manure	Value of crop minus cost of manure	
		1929	Average 5 years		1929	Average 5 years
				\$	\$	\$
1	Oats (Alaska) (straw..... ton	0.39	0.67			
	(grain..... bush.	45.0	34.1	4 80	38 04	19 89
2	Barley (straw..... ton	0.52	0.71			
	(grain..... bush.	21.9	21.6	7 20	20 01	16 55
3	Clover hay..... ton	1.58	1.52	4 80	18 90	15 83
4	Timothy hay..... ton	1.92	1.70	7 20	21 60	19 20
	Average per acre.....			6.00	24 64	17 87

## LIME EXPERIMENT

The object of this experiment is to determine the results from an application of 2 tons of ground limestone per acre during the second year of the rotation. This experiment was commenced in 1922 under a four-year rotation, including oats, barley, clover hay and timothy hay. The timothy sod is fall-ploughed for oats. After these are harvested, it is again fall-ploughed and given an application of ground limestone in addition to 8 tons of manure in preparation for seeding out to grass and clover using barley as a nurse-crop. After the clover hay is cut, a top dressing of manure at the rate of 8 tons per acre is applied for the benefit of the timothy hay and oat crop which follow. The results from the different crops are as follows:—

LIME EXPERIMENT—RESULTS IN 1929

Rotation year	Crops	Yield per acre		Cost of manure	Value of crop minus cost of manure	
		1929	Average 5 years		1929	Average 5 years
				\$	\$	\$
1	Oats (Alaska) (straw..... ton	0.66	0.87			
	(grain..... bush.	38.2	32.8	4 80	33 54	19 69
2	Barley (straw..... ton	0.56	0.70			
	(grain..... bush.	23.7	22.8	7 20	22 23	17 82
3	Clover hay..... ton	1.46	1.26	4 80	17 10	12 10
4	Timothy hay..... ton	2.07	1.87	7 20	23 85	21 78
	Average per acre.....			6 00	24 18	17 85

## DRAINAGE EXPERIMENT

The object of this experiment is to compare the results from tile-drained land with that which is not tile drained. For this test 20 acres of uniform clay-loam soil, which had some shallow muck areas in each half, were selected. Ten acres of this area were under-drained in 1921 with four tile drains, while the other ten acres were left undrained.

The whole area was placed under the following four-year rotation:—

First year.....	Sunflowers or O.P.V.
Second year.....	Oats
Third year.....	Clover hay
Fourth year.....	Timothy hay

The results in 1929 from clover hay are as follows:—

DRAINAGE EXPERIMENT—RESULTS IN 1929

	Drained	Undrained
Total cost per acre..... \$	19 54	19 37
Yield per acre..... ton	1 72	1 60
Value of crop per acre..... \$	25 80	24 02
Profit per acre..... \$	6 26	4 65
Cost per ton..... \$	11 36	12 10

Over a two-year period for new meadow the yield for the drained area is 1.74 tons per acre and and 1.53 for the undrained.

SURFACE DRAINAGE EXPERIMENT

The object of this experiment is to compare the results from using four different widths of lands when ploughing as follows:—

First area.....	18 feet in width
Second area.....	24 feet in width
Third area.....	36 feet in width
Fourth area.....	48 feet in width

This experiment is operated under a four-year rotation, including sun-flowers or O.P.V., oats, clover hay and timothy hay. The results from the timothy hay in 1929 are as follows:—

SURFACE DRAINAGE EXPERIMENT—RESULTS IN 1929

Width of lands	Yield
	per acre
	ton
Lands 18 feet in width.....	1 21
Lands 24 feet in width.....	0 99
Lands 36 feet in width.....	1 09
Lands 48 feet in width.....	1 43

HORTICULTURE

ORCHARD

The orchard, which was set out at this Station in 1918, is making rather slow progress, as each winter seems to freeze back a number of the trees to the snow line. However, those that are killed are being replaced by new and more promising varieties, so that in time this process of natural elimination should result in the establishment of the most hardy and best suited varieties for this climate.

Some of those which to date have proven the most hardy are as follows: Mecca, Osman, Columbia, and Dolgo.

SMALL FRUITS

**RED CURRANT.**—The seven varieties set out in 1920 gave the following yields in pounds from six bushes: Red Grape, 37.8; London Red, 34.7; Simcoe King, 34; Red Dutch, 31.1; Red Cross, 29.5; Long Bunch Holland, 28.1; and Victoria, 27.

**WHITE CURRANT.**—Two varieties were set out in 1920. White Grape gave 27 pounds and White Cherry 24 pounds from six bushes.

**BLACK CURRANT.**—Fourteen varieties are under test since 1920. The yields in pounds from six bushes are as follows: Saunders, 28; Climax, 25; Eclipse,

23; Ontario, 22.3; Beauty, 20.5; Topsy, 20; Collins Prolific, 20; Victoria, 19.9; Budenborg, 19.3; Kerry, 16.1; Magnus, 15.8; Eagle, 14.9; Clipper, 14; and Lee Prolific, 9.8.

RASPBERRIES.—Eight varieties have been under test since 1920. The results in pounds per 30-foot row are as follows: Early June, 23.5; Cuthbert, 21.2; Herbert, 20.8; Brighton, 20.1; St. Regis, 12.4; King, 11.4; Newman No. 23, 9.6; and Sunbeam, 5.9.

AUTUMN VERSUS SPRING PLANTING OF RASPBERRIES.—The object of this experiment is to compare the results from raspberries when planted in the autumn and in the spring. Nine varieties were used. The autumn planting was done in October, 1925, and the spring planting in May, 1926. The results in 1929 are as follows:—

AUTUMN VERSUS SPRING PLANTING OF RASPBERRIES—RESULTS IN 1929

Varieties	Yield from 50-foot row			
	Fall planting		Spring planting	
	lb.	oz.	lb.	oz.
Brighton.....	38	12	24	2
St. Regis.....	35	5	28	0
King.....	28	3	28	7
Newman No. 23.....	27	6	19	11
Herbert.....	26	8	25	5
Early June.....	25	1	21	11
Sunbeam.....	10	4	14	4
Viking.....	6	11	6	2
Count.....	6	3	11	0
Average.....	22	11	19	14

## VEGETABLES

SUMMARY OF VARIETY TESTS IN 1929

Vegetable	Number of varieties	Where sown	Date sown	Date planted in garden	Distance between rows	Distance between plants
					in.	in.
Bean.....	22	Garden.....	June 10	.....	30	2
Broad Bean.....	4	Garden.....	May 10	.....	36	6
Beet.....	9	Garden.....	May 10	.....	18	2
Cabbage, Early.....	4	Hotbed.....	April 30	June 17	30	18
Cabbage, Late.....	3	Hotbed.....	April 30	June 17	30	24
Cauliflower.....	2	Hotbed.....	April 30	June 17	30	18
Celery.....	10	Greenhouse...	April 9	June 24	48	6
Carrot.....	7	Garden.....	May 10	.....	18	1½
Egg Plant.....	3	Greenhouse...	April 11	June 27	18	12
Endive.....	1	Garden.....	May 28	.....	18	6
Kohl Rabi.....	2	Garden.....	May 10	.....	30	8
Kale or Borecole.....	2	Hotbed.....	April 30	June 17	30	24
Leek.....	2	Hotbed.....	April 30	June 17	18	6
Lettuce.....	11	Garden.....	May 10	.....	18	6
Onion.....	14	Garden.....	May 27	.....	18	1
Parsley.....	1	Hotbed.....	April 30	June 17	18	6
Parsnip.....	3	Garden.....	May 28	.....	30	2
Peas.....	13	Garden.....	May 1	.....	36	1
Potato.....	2	Garden.....	June 12	.....	30	15
Radish.....	6	Garden.....	May 10	.....	18	6
Spinach.....	4	Garden.....	May 28	.....	18	6
Salsify.....	2	Garden.....	May 28	.....	18	1½
Turnip.....	3	Garden.....	May 28	.....	18	2
Tomato.....	20	Greenhouse...	April 10	June 26	36	36

**BEANS.**—The results in quarts per 30-foot row from the ten highest yielding varieties are as follows: Hodson Long Pod, 12; Masterpiece, 11.3; Wardwell Kidney wax, 11.5; Hidasta, 11; No. 1, White Pole, 11; Refugee, 10.5; Davis White Wax, 10.5; Plentiful French, 10; Round Pod Kidney Wax, 9.8; and Yellow Eye Yellow Pod, 9.8.

**BROAD BEANS.**—The results in quarts per 30-foot row are as follows: Long Pod Masterpiece, 57; Long Pod Green, 56; Mazagan, 44.5; and Johnson Wonder, 43.5.

**BEETS.**—The results in pounds per 30-foot row are as follows: Detroit Dark Red, McD., 46.7; Cardinal Globe, 46.1; Detroit Dark Red, Moore, 44.6; Detroit Dark Red, C. E. F., 40.7; Crosby Egyptian, 39.9; Black Red Ball, 37.9; Early Flat Egyptian, 37.9; Early Wonder, 37.4; and Detroit Dark Red, Graham, 37.2.

**CABBAGE.**—The results in pounds per 30-foot row are as follows: Golden Acre, 69; Kildonan, 68; Copenhagen Market, 65.9; Mammoth Aubervilliers, 58.5; Early Jersey Wakefield, 55.5; Extra Amager Danish Ballhead, 53.3; and Charleston Wakefield, 33.5.

**CAULIFLOWER.**—Early Snowball gave 54.8 and Dwarf Erfurt 35.5 pounds per 30-foot row.

**CELERY.**—The results in pounds per 30-foot row are as follows: Easy Blanching, McDonald, 177.5; Easy Blaching, Graham, 176; French Success, 173; Giant Pascal, 160; Fordhook Emperor, 143.3; Winter Queen, 142.8; Golden Self Blanching, C. E. F. 135.5; Paris Golden Yellow, 130.8; Golden Self Blanching, McDonald, 113.5; and White Plume, 102.8.

**CARROTS.**—The results in pounds per 30-foot row are as follows: Garden Gem, 68.1; Danvers Half Long, 64.8; Nantes, 63; Oxheart, 57.3; Improved Danvers, 51.6; Early Scarlet Horn, 42.9; and Chantenay, 35.9.

**ENDIVE.**—Fine Green Curled gave a yield of 19 pounds per 30-foot row.

**KOHL RABI.**—Purple Vienna gave 51.6 and White Vienna 31.1 pounds per 30-foot row.

**KALE OR BORECOLE.**—Tall Green gave 87 and Dwarf Green Curled 42.6 pounds per 30-foot row.

**LEEKs.**—Carentan gave 17.8 and Musselburgh 17.3 pounds per 30-foot row.

**LETTUCE.**—The three common types, head, cos and leaf were included which do very well in this district and give a product which is quite high in quality and crispness. The average yield from the eleven varieties was 54.1 pounds per 30-foot row.

**ONIONS.**—The results in pounds per 30-foot row of green onions are as follows: Southport Red Globe, Graham, 67; White Barletta, 59.8; Ailsa Craig, 59; White Spanish, 59; Early flat Red, 53.5; Southport Red Globe, Steele Briggs, 58; Yellow Globe Danvers, Steele Briggs, 56; Australian Brown, 54.3; Southport Yellow Globe, 52.5; Southport White Globe, 47.5; Yellow Globe Danvers, Graham, 39.5; Giant Prizetaker, 37.8; Yellow Globe Danvers, C. E. F., 27.8; and Large Red Wethersfield, 26.9.

**PARSLEY.**—Moss Curled gave a yield of 10.8 pounds per 30-foot row.

**PARSNIPS.**—The results in pounds per 30-foot row are as follows: Elcombe Improved Hollow Crown, 44.5; Guernsey XXX, 36.5; and Hollow Crown, 33.5.

**GARDEN PEAS.**—The results in quarts per 30-foot row are as follows: McLean Advancer, Harris, 29.5; Kootneay, 29; Lincoln, 27.1; Gregory Surprise x English Wonder, 26.5; Stratagem, 25.9; Director, 24.8; Bruce, 24.4; English Wonder x Gradus, 18.8; Thomas Laxton, 18; American Wonder, 13.8; English Wonder, 13; Laxtonian, 11.8; and McLean Advancer, Ferry, 7.5.

POTATOES.—The tubers were planted in quadruplicate one-eightieth-acre plots. The Irish Cobbler variety gave 307 bushels of marketable and 56 bushels of unmarketable per acre, and the Green Mountain gave 338 bushels and 40 pounds of marketable and 52 bushels and 40 pounds of unmarketable per acre.

RADISH.—The results in pounds per 30-foot row are as follows: Chartier, 13·8; Scarlet Turnip White Tip, 9·6; XXX Scarlet Oval, 9·4; French Breakfast, James, 9·1; French Breakfast, Patmore, 7·6; and Long White Icicle, 7.

SPINACH.—Victoria gave 5·4; Long Standing, 5·4; Bloomsdale, 5·1; and Broad Flanders, 2·6 pounds per 30-foot row.

SALSIFY.—Mammoth Sandwich Island gave 35, and Long Black, 14·5 pounds per 30-foot row.

TURNIP.—Early Purple Top Milan gave 31·3; Golden Ball, 26·5; and Red Top Strap Leaf, 23·3 pounds per 30-foot row.

TOMATOES.—The results are as follows:—

VARIETY TEST WITH TOMATO, RESULTS IN 1929

Variety	Source	Date first ripe fruit	Yield per 30-foot row			
			Ripe		Green	
			lb.	oz.	lb.	oz.
Pink No. 2.....	C.E.F.....	Aug. 30	7	11	20	3
Alacrity x Earlibell.....	C.E.F.....	Aug. 30	6	6	18	10
Viking.....	N.D.A.C.....	Aug. 30	7	0	18	4
Pink No. 1.....	C.E.F.....	Aug. 30	6	14	17	6
Prosperity.....	Patmore.....	Aug. 30	4	3	15	14
Early Mascot.....	Graham.....	Aug. 30	6	2	15	12
Herald.....	C.E.F.....	Aug. 30	5	9	15	7
Avon Early.....	Ferry.....	Aug. 30	7	9	15	4
Bonny Best.....	Moore.....	Aug. 30	6	8	14	2
Select Earliana.....	Moore.....	Aug. 30	5	10	13	12
Alacrity x Bonny Best.....	C.E.F.....	Aug. 30	6	14	13	12
Fargo.....	N.D.A.C.....	Aug. 30	5	8	13	8
Bonny Best.....	Stokes.....	Sept. 7	5	4	13	7
John Baer.....	Moore.....	Aug. 30	8	0	11	0
Avon Early.....	Dreer.....	Aug. 30	4	15	10	8
Chalk Early Jewel.....	Steele Briggs.....	Aug. 30	4	4	10	8
Marglobe.....	Stokes.....	Aug. 30	4	10	10	0
L. G. and B.B.....	C.E.F.....	Aug. 30	7	10	9	6
Bonny Best.....	Keith.....	Aug. 30	4	3	8	0
Alacrity.....	C.E.F.....	Aug. 30	6	12	7	13

## CULTURAL EXPERIMENTS

PAPER POTS OR COLLARS WITH CAULIFLOWER.—The object of this experiment is to determine to what extent paper pots or collars will protect cauliflower plants from attack by insects. When the plants are being transplanted to the garden a paper pot about 3 inches in diameter is placed around each plant, while an equal number is planted in the usual way. Those protected gave a 98 per cent stand and a yield of 42·1 pounds, while those unprotected gave a 90 per cent stand and a yield of 28·5 pounds per 30-foot row.

RATE OF PLANTING PEAS.—The object of this experiment is to compare the results from planting peas, 1, 2, and 3 inches apart in the row. Three varieties were used. The seed was planted on May 1, in rows 30 feet in length and 30 inches apart. The results are as follows:—

## RESULTS FROM DIFFERENT RATES OF PLANTING PEAS

Variety	Yield per 30-foot row					
	1929			Five-year average		
	One inch	Two inches	Three inches	One inch	Two inches	Three inches
	Quart	Quart	Quart	Quart	Quart	Quart
English Wonder.....	27.0	25.5	25.3	17.8	15.8	15.0
Thomas Laxton.....	24.0	22.3	21.8	18.4	16.3	14.4
Stratagem.....	32.3	21.0	21.0	21.0	16.6	16.3

PRUNING EXPERIMENT WITH TOMATOES.—The object of this experiment is to compare the results in yield, quality and maturity of fruit produced from various methods of pruning tomato plants to a single stem. Two varieties were used. The seed was sown in the greenhouse on April 10, and the plants set out in the garden on June 26, in rows 2 feet apart, and the plants 1 foot apart in the row. The results are as follows:—

## RESULTS OF PRUNING EXPERIMENT WITH TOMATOES

Variety	Method of pruning to single stem	First ripe fruit	Yield from 25 plants			
			1929		Two-year average	
			Ripe	Green	Ripe	Green
		1929	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Bonny Best.....	Not Headed Back.....	Aug. 30	12 6	16 12	12 3	52 14
Bonny Best.....	Stopped Third Truss of Fruit..	"	14 5	5 0	15 5	25 8
Bonny Best.....	Stopped Second Truss of Fruit..	"	14 12	3 0	16 4	10 8
Bonny Best.....	Stopped First Truss of Fruit....	"	12 13	1 4	12 8	7 2
Alacrity.....	Not Headed Back.....	"	9 15	15 2	13 7	38 1
Alacrity.....	Stopped Third Truss of Fruit..	"	18 8	11 0	16 3	21 8
Alacrity.....	Stopped Second Truss of Fruit..	"	16 10	7 4	18 2	13 10
Alacrity.....	Stopped First Truss of Fruit..	"	19 4	1 8	19 2	5 12

NITRATE OF SODA FOR VEGETABLES.—The object of this experiment is to compare the results from vegetables which are treated with nitrate of soda versus those which received only the usual application of manure. The nitrate was applied on one-half of each row at the rate of 300 pounds per acre divided into three applications of 100 pounds each. The first application was given on June 29, and the other two at intervals of 10 days. The results are as follows:—

## RESULTS WITH NITRATE OF SODA FOR VEGETABLES

Vegetables	Yield per thirty-foot row							
	1929				Three-year average			
	Nitrate		No nitrate		Nitrate		No nitrate	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Beet.....	42	3	39	10	41	7	39	10
Cabbage.....	63	7	51	15	71	12	60	3
Carrots.....	57	7	52	1	66	4	58	14
Cauliflower.....	52	2	38	3	43	10	30	14
Kohl Rabi.....	46	12	36	0	48	15	40	5
Lettuce.....	62	0	46	2	51	12	44	9
Paranip.....	41	8	36	11	64	1	51	14
Salsify.....	27	0	22	8	44	11	36	15
Garden Turnip.....	29	11	24	5	36	10	38	8

## PAPER MULCH EXPERIMENT

A paper mulch experiment with vegetables was undertaken this spring. The plots were one thirty-foot row and were planted in duplicate. Owing to the backward spring, the seeding was much later than normally. All those sorts which were planted direct in the garden were seeded on June 6, while cabbage and celery were set out on June 24, cucumber and melon June 27, pepper, egg plant and tomato on June 28.

The paper was laid down just previous to seeding, leaving a space of about one inch between the sheets for the young plants to come up through.

With the transplanted crops the entire area was first covered with paper and a hole was afterwards made in the form of a cross for each plant.

The paper was held down by 1 inch by 4 inch by 16-foot boards placed on each edge of the paper and this seemed to answer the purpose very well for about 3 to 4 weeks. After this time the paper appeared to partially decay and weaken along the edge of the boards, so that it would tear off with a strong wind. For the remainder of the season some difficulty was experienced in keeping the paper in place. In some cases the boards were moved over, while in other cases, stones, lumps of earth, etc. were used as a temporary means of holding it in place. The results are as follows:—

RESULTS FROM PAPER MULCH EXPERIMENT 1929

Crops	Variety	Yield			
		Paper		No paper	
		lb.	oz.	lb.	oz.
Bean.....	Round Pod Kidney Wax.....	5	9	5	8
Bean.....	Stringless Green Pod.....	6	0	6	6
Beet.....	Detroit Dark Red.....	20	4	26	0
Cabbage.....	Viking.....	43	15	52	9
Cauliflower.....	Super Standard Snowball.....	7	6	20	8
Carrot.....	Chantenay.....	9	14	9	11
Celery.....	Golden Plume.....	54	8	74	12
Corn.....	Golden Bantam.....	0	0	0	0
Cucumber.....	Harris Perfection.....	0	0	0	0
Egg Plant.....	New York Purple.....	0	0	0	0
Lettuce.....	Iceberg.....	6	8	6	4
Muskmelon.....	Hearts of Gold.....	0	0	0	0
Onion.....	Yellow Globe Danvers.....	3	6	9	11
Pepper.....	Harris Earliest.....	0	0	0	0
Potato.....	Irish Cobbler.....	42	5	45	9
Potato.....	Green Mountain.....	50	10	51	6
Spinach.....	King of Denmark.....	8	3	7	12
Tomato.....	Bonny Best.....	3	12	2	15

The yield as shown for cabbage, cauliflower, celery, onions, potatoes and spinach represent that obtained from a 30-foot row, while the yield shown for beans, beets and carrots are for a 15-foot row, and the figures for lettuce are for six average heads.

The corn, cucumber, egg plant, muskmelon and pepper failed to produce any yield.

One season's figures are not enough from which to draw any definite conclusions. However, it does appear as though the use of paper mulch did not materially increase the yield of the common vegetables included. Perhaps the kind of vegetables which would respond most to this treatment are the ones which failed to mature at this station this year.

In point of labour, the paper is apparently quite efficient in keeping the weeds under control, thereby reducing the time required in hoeing. This of course is partly offset by the extra time which is required when planting, in placing the paper and whatever is used in holding it in place.

## FLOWERS

The season was particularly good for the production of annual flowers. The bloom was profuse and continued from early summer until well on in the autumn.

Fifty-seven distinct types or kinds of annual flowers were under test. Several of these were represented by many varieties and colours. Thirty-two were sown in the greenhouse on April 12, 18 and 19. These were transplanted to the borders on June 24, 25, 26 and 27.

Among those which are started in the greenhouse and have been found to give the best results over a period of years are the following: *Acroclinium*, *Aster*, *Chrysanthemum* (Bridal Robe), *Cosmos*, *Dimorphotheca*, *Gaillardia*, *Helichrysum*, *Marigold*, *Nicotiana*, *Phlox Drummondii*, *Scabiosa*, *Schizanthus*, *Stock*, *Salpiglossis*, *Tagetes*, *Verbena*, and *Zinnia*.

Twenty-five sorts were sown direct in the open on June 3, 4 and 5 with the exception of Sweet Peas which were seeded on May 31. Among the best of those tried for growing in this manner are the following: *Alyssum*, *Browallia*, *Calendula*, *Candytuft*, *Cornflower*, *Clarkia*, *Eschscholtzia*, *Gypsophila*, *Larkspur*, *Lavatera*, *Virginian Stock*, *Linaria*, *Mignonette*, *Nasturtium*, *Poppy*, *Sunflower*, *Sweet Sultan*, and *Sweet Peas*.

Bulbs have been used quite extensively as a means of getting magnificent bloom in the very early spring. Each autumn a number of the best varieties of *Tulips*, *Narcissus*, and *Crocus* are planted and the majority of these have been proving hardy and giving excellent results.

### PERENNIAL FLOWERS

Perennial flowers form one of the best and most permanent means of ornamenting the lawn and home surroundings. The following sorts are proving hardy at this station: *Anemone*, *Aquilegia*, *Campanula*, *Chrysanthemum*, *Coreopsis*, *Delphinium*, *Dianthus*, *Papaver*, *Paeonia*, *Gaillardia*, *Platycodon*, *Rudbeckia*, *Spiraea*, and *Iris*.

### TREES AND SHRUBS

The judicious planting of hardy trees and shrubs is one of the most effective means of adding beauty and comfort to the home surroundings. The past year has been very favourable to the growth and development of this class of material.

The laurel-leaved willow and Russian poplar continue to prove hardy. These are both very rapid growers and the former may be used either for individual trees or hedge purposes. The *Caragana* is also one of the best sorts tried as a deciduous hedge.

While the laurel-leaved willow and *Caragana* give good deciduous hedges, they cannot be expected to provide a shelter equal to an evergreen hedge particularly during the winter months. The common *White Spruce* is proving one of the most suitable sorts for this purpose, and as these may be obtained in the local woods or from the Ontario Forestry Branch every settler should endeavour to get some shelter belts and hedges established.

Some of the more hardy ornamental shrubs are the *lilac*, *Caragana*, *Japanese rose*, *Japanese barberry*, *Golden currant*, *Tartarian honeysuckle*, *Viburnum* *lantana* and *Mountain ash*.



## CEREALS

## SPRING WHEAT

Five varieties were under test. The seed was sown on May 29, in quadruplicate, one-fortieth-acre plots, at the rate of 2 bushels per acre. The results are as follows:—

RESULTS OF VARIETY TEST WITH SPRING WHEAT

Variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of ten points	Actual yield of grain per acre		Number of days maturing 10-year average 1920-29	Yield of grain per acre 10-year average 1920-29	
			in.		bush.	lb.		bush.	lb.
Marquis, Ott. 15.....	Oct. 4..	128	33	9.0	25	10	121	26	39
Huron, Ott. 3.....	Oct. 4..	128	35	9.0	25	0	122	27	59
Garnet, Ott. 652.....	Sept. 20	114	30	8.5	23	5			
Reward, Ott. 928.....	Sept. 23	117	31	9.0	23	20			
Ruby, Ott. 623.....	Sept. 22	116	30	8.8	22	10	111	21	21

It is worthy of note that the Reward, Garnet, and Ruby varieties are at least ten days earlier than either Marquis or Huron. This is a strong point in their favour for northern districts, particularly during years of forced late seeding and also years when the late harvest weather turns unfavourable.

## OATS

Seven varieties were under test. The seed was sown on June 1, in quadruplicate, one-fortieth-acre plots, at the rate of 2½ bushels per acre. The results are as follows:—

RESULTS OF VARIETY TEST WITH OATS

Variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of ten points	Actual yield of grain per acre		Number of days maturing 10-year average 1920-29	Yield of grain per acre 10-year average 1920-29	
			in.		bush.	lb.		bush.	lb.
Laurel, Ott. 477.....	Sept. 22	113	32	9.0	52	22			
Alaska.....	Sept. 21	112	34	8.5	49	14	112	52	12
Liberty, Ott. 480.....	Sept. 21	112	35	8.5	47	2	114	41	15
Victory.....	Oct. 4	125	40	9.0	35	20	123	60	8
O.A.C. No. 72.....	Oct. 4	125	39	9.0	31	26			
Banner, Ott. 49.....	Oct. 4	125	40	9.0	31	6	124	56	15
Gold Rain.....	Oct. 4	125	41	9.0	31	6	121	57	32

It should be noted that the Alaska variety is the earliest of those grown over an eight-year period. The weight per measured bushel and general quality of this variety are also particularly good. Liberty and Laurel are both hullless varieties.

## BARLEY

Seven varieties were under test. The seed was sown on June 5, in quadruplicate one-fortieth-acre plots at the rate of 2 bushels per acre. The results are as follows:—

RESULTS OF VARIETY TEST WITH BARLEY

Variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of ten points	Actual yield of grain per acre		Number of days maturing 9-year average 1921-29	Yield of grain per acre 9-year average 1921-29	
					bush.	lb.		bush.	lb.
Gold.....	Sept. 28	115	31	6.8	64	38			
Chinese Ott. 60.....	Sept. 22	109	38	7.3	50	40			
Himalayan Ott. 59.....	Sept. 19	106	29	8.8	46	22	107	36	3
Manchurian Ott. 50.....	Sept. 24	111	40	6.5	44	18	113	40	10
O.A.C. No. 21.....	Sept. 22	109	38	8.5	43	36	111	41	36
Charlottetown 80.....	Oct. 2	119	35	8.0	31	12			
Duckbill Ott. 57.....	Oct. 4	121	37	9.0	29	18	119	39	18

Gold, Charlottetown 80, and Duckbill Ott. 57 are all two-rowed varieties, while Himalayan Ottawa 59 is a six-rowed hulless variety. O.A.C. No. 21, Chinese Ottawa 60, and Manchurian Ottawa 50 are all standard six-rowed varieties.

## FIELD PEAS

Five varieties were under test. The seed was sown on May 17, in quadruplicate one-fortieth-acre plots. The average rate of seeding was 3 bushels per acre. The results are as follows:—

RESULTS OF VARIETY TEST WITH FIELD PEAS

Variety	Date of ripening	Number of days maturing	Average length of plant	Actual yield of grain per acre		Number of days maturing 4-year average 1926-29	Yield of grain per acre 4-year average 1926-29	
				bush.	lb.		bush.	lb.
Chancellor Ott. 26.....	Sept. 25	121	40	42	20	116	40	45
Arthur Ott. 18.....	Sept. 25	121	35	41	20	122	44	25
Mackay Ott. 25.....	Oct. 4	130	51	36	40	133	38	50
Golden Vine.....	Sept. 30	126	56	33	50	120	37	48
Early Raymond.....	Sept. 23	119	39	27	30	117	30	38

Early maturity is one of the most important factors in the successful growing of peas in this district. Although the Early Raymond, Arthur, and Golden Vine varieties all mature about the same time, the Chancellor variety, being a small pea, appears to harden up just a little better than any of the others.

## COMMON VETCH

One variety of vetch, namely, Common, was sown on June 5, in quadruplicate one-fortieth-acre plots, at the rate of 1½ bushels per acre. Owing to the fact that vetch requires a long period of time to mature, the seeding was too late this year to permit the seed coming to full maturity and consequently a yield of only 120 pounds per acre was obtained.

### SPRING RYE

One variety, namely, Common Spring Rye, was under test. The seed was sown on June 5, in quadruplicate one-fortieth-acre plots at the rate of  $1\frac{1}{2}$  bushels per acre. It matured in 121 days and gave a yield of 41 bushels and 34 pounds per acre. Over an eight-year period the average yield is 28 bushels and the number of days to mature 122.

### FALL WHEAT

Six varieties and strains were under test. The seed was sown on August 27, 1928, in quadruplicate one-fortieth-acre plots at the rate of 2 bushels per acre. The results are as follows:—

RESULTS OF VARIETY TEST WITH FALL WHEAT

Variety	Strength of straw on scale of ten points	Average length of plant	Actual yield of grain per acre	
		in.	bush.	lb.
Kharkov M.C. 22.....	10	42	12	30
Minhardi.....	10	36	8	40
Kanred.....	10	36	7	0
Kharkov (Lethbridge).....	10	37	6	50
O.A.C. 104.....	10	38	5	10
D. G. Chaff.....	10	39	5	10

It may be noted that the above yields are quite light and this may be explained by the fact that owing to the absence of snow in the late fall of 1928 and the early spring of 1929 the season was particularly hard on fall grains. In fact most of the plots were actually less than a 50 per cent stand.

### FALL RYE

Two varieties were under test. The seed was sown on October 3, 1928, in triplicate one-fortieth-acre plots, at the rate of  $1\frac{1}{2}$  bushels per acre. The results are as follows:—

RESULTS OF VARIETY TEST WITH FALL RYE

Variety	Strength of straw on scale of ten points	Average length of plant	Actual yield of grain per acre	
		in.	bush.	lb.
Dakold.....	10	45	18	32
Common.....	10	46	17	48

### ROD-ROW PLOTS

In 1929, twenty-six varieties and strains of spring wheat, thirty-seven of oats, and thirty-five of barley were under test by this method. Although the seeding was the latest in the history of the Station most of the plots came along very nicely. In a few cases the crop was adversely affected by too much rain.

## FORAGE CROPS

### ENSILAGE CROPS

#### VARIETY TEST WITH SUNFLOWERS

Five varieties were under test. The seed was sown on June 13, in quadruplicate one-fortieth-acre plots, on fall-ploughed sod which was manured at the rate of 16 tons per acre previous to ploughing. The rows were 30 inches

apart, and the plants were thinned to from 6 to 12 inches apart in the row. Germination was good and although the date of seeding was unusually late fairly good yields were obtained. They were harvested on October 1. The results are as follows:—

RESULTS OF VARIETY TEST WITH SUNFLOWERS

Variety	Source of seed	Average height, 1929 in.	Per cent in bloom when cut, 1929	Yield per acre							
				1929				Average 1924-29			
				Green weight		Dry weight		Green weight		Dry weight	
ton	lb.	ton	lb.	ton	lb.	ton	lb.				
Mammoth Russian	McDonald	64	0	13	430	1	1,848	14	1,393	1	1,757
Mammoth Russian	Dakota Improved Seed Co.	69	13	13	1,660	1	1,792	14	1,878	1	1,877
Early Ottawa 76	C.E.F.	64	71	12	520	1	1,737	11	1,582	1	1,220
Mennonite	Rosthern	57	100	10	510	1	1,554				
Manchurian	McKenzie	60	38	10	1,980	1	1,463	11	468	1	1,292

Mammoth Russian is the variety used in the field crop areas at this Station.

## VARIETY TEST WITH CORN

Twenty-three varieties were under test. The seed was planted on June 15, in quadruplicate one-eightieth-acre plots on fall-ploughed clay land which had been manured at the rate of 16 tons per acre for the previous crop. The corn was planted in hills 30 inches apart each way with 4 to 6 kernels to the hill. The seed germinated well but for some reason the growth throughout the season was not good, so that the average yield was only about one-half of that obtained in 1928. The average yield per acre of green material for the 23 varieties was 4 tons 358 pounds and 1,044 pounds of dry material.

## ANNUAL HAYS

## PEAS AS ANNUAL HAY

Five varieties were under test. The seed was sown on June 19, in quadruplicate one-fortieth-acre plots on fall-ploughed clay-loam soil which was manured at the rate of 16 tons per acre for the previous crop. The average rate of seeding was 3 bushels per acre. The plots were harvested on September 26. The results are as follows:—

RESULTS OF VARIETY TEST WITH PEAS AS ANNUAL HAY

Variety	Yield per acre							
	1929				Average 1924-29			
	Dry weight		Cured hay containing 15% moisture		Dry weight		Cured hay containing 15 per cent moisture	
ton	lb.	ton	lb.	ton	lb.	ton	lb.	
Canadian Beauty	1	1,599	2	234	2	394	2	1,169
Mackay	1	1,315	1	1,900				
Chancellor	1	1,307	1	1,891				
Arthur	1	1,220	1	1,788	2	339	2	1,105
Golden Vine	1	1,138	1	1,692	2	309	2	1,069

From these figures it may be noted that peas give very good yields when grown as annual hay, but they appear to lack palatability when fed alone. Owing to their rank growth and high protein content, however, they improve both the yield and quality of the crop when sown in a mixture with oats or oats and vetch.

#### VETCH AS AN ANNUAL HAY

Common vetch was under test as an annual hay. The seed was sown on June 19, in quadruplicate one-fortieth-acre plots, on fall-ploughed clay-loam soil which was manured at the rate of 16 tons per acre for the previous crop. The rate of seeding was  $1\frac{1}{2}$  bushels per acre. The plots were harvested on September 26. The results are as follows:—

#### RESULTS WITH VETCH AS AN ANNUAL HAY

Variety	Yield per acre							
	1929				Average 1924-29			
	Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
ton	lb.	ton	lb.	ton	lb.	ton	lb.	
Common.....	1	517	1	961	1	1,678	2	327

Vetch grows very well and gives a fair yield of dry matter. It is better, however, to be sown in a mixture with oats or oats and peas. Probably the most serious objection to this crop is the high cost of the seed, which does not mature very well in this district.

#### SWEET CLOVER AS ANNUAL HAY

Three varieties were under test. In 1929 the seed was sown on June 19, in quadruplicate one-fortieth-acre plots at the rate of 20 pounds per acre. The crop was harvested on September 26. The results are as follows:—

#### RESULTS OF VARIETY TEST WITH SWEET CLOVER AS ANNUAL HAY

Variety	Yield per acre							
	1929				5-year average			
	Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
ton	lb.	ton	lb.	ton	lb.	ton	lb.	
White Blossom.....	0	1,874	1	205	1	1,444	2	52
Yellow Blossom.....	0	1,690	0	1,988	1	316	1	725
Hubam.....	1	366	1	784	1	1,975	2	676

The Hubam, which is an annual sweet clover, has given the largest yield both this year and in the five-year average. The White Blossom variety, however, has also given very good yields and considering that it gives a good yield the second year without further seeding it may prove to be the best paying variety to use.

## FIELD ROOTS

The field roots were all seeded in quadruplicate one-eightieth-acre plots, on fall-ploughed sod which was manured at the rate of 16 tons per acre previous to ploughing.

## MANGELS

Thirty-three varieties were under test. The seed was sown on June 12, and the plants were thinned to 8 inches apart in the row. However, there were practically no plots on which a full stand was obtained. In fact some of the plots were less than a 50 per cent stand. The plots were harvested from October 10 to 14. The results are as follows:—

RESULTS OF VARIETY TEST WITH MANGELS

Variety	Source of seed	Per cent true to type 1929	Yield per acre								
			1929		Average 1925-29						
			Green weight		Dry weight		Green weight		Dry weight		
			ton	lb.	ton	lb.	ton	lb.	ton	lb.	
Giant Rose.....	Bruce.....	95	7	1,220	1	367					
Giant White Feeding Sugar.	Steele Briggs.....	90	7	1,640	1	165		9	728	1	356
New Ideal.....	Steele Briggs.....	99	7	1,600	1	119		8	1,460	1	114
Gate Post.....	Bruce.....	90	6	1,320	1	60					
Giant White Feeding.....	Bruce.....	94	6	440	0	1,837		9	660	1	336
Barres Oval.....	G. Swedish.....	95	6	440	0	1,833		9	124	1	280
Stryno Barres.....	Hartman.....	90	6	160	0	1,827		9	1,136	1	385
Elvethan Mammoth.....	Hartman.....	95	5	1,020	0	1,767		8	312	1	316
Giant Yellow Globe.....	Steele Briggs.....	95	6	1,160	0	1,765		8	284	0	1,893
Red Eckendorfer.....	G. Swedish.....	98	6	480	0	1,744		8	248	0	1,921
Yellow Leviathan.....	Steele Briggs.....	95	6	340	0	1,676		8	1,904	1	305
Golden Tankard.....	Bruce.....	60	5	680	0	1,637		7	264	0	1,889
Prize Mammoth Long Red.	Steele Briggs.....	95	5	400	0	1,629					
White Red Top Half Sugar.	Hartman.....	94	5	280	0	1,609		7	1,924	1	111
Taaroe Barres.....	Hartman.....	95	5	540	0	1,601					
Royal Giant Sugar Beet...	Steele Briggs.....	90	5	1,020	0	1,563					
Sludstrup Barres.....	Hartman.....	95	4	1,940	0	1,530					
Giant Yellow Intermediate.	Steele Briggs.....	85	5	0	0	1,438		8	396	1	116
White Green Top Half Sugar.	Hartman.....	95	4	860	0	1,433		8	820	1	215
Eckendorfer Red.....	Hartman.....	95	5	600	0	1,420		8	1,384	0	1,964
Svalop Original Rubia.....	G. Swedish.....	98	4	800	0	1,403					
Yellow Eckendorfer.....	G. Swedish.....	95	5	100	0	1,392		8	1,808	1	10
Yellow Leviathan.....	Bruce.....	98	4	460	0	1,333		8	492	1	44
Barres Half Long.....	G. Swedish.....	98	4	780	0	1,315		8	32	1	145
Eckendorfer Yellow.....	Hartman.....	98	4	1,360	0	1,307		9	132	1	104
Fjerritslev Barres.....	Hartman.....	90	4	1,160	0	1,306		8	1,660	1	158
Red Globe.....	Bruce.....	95	3	1,700	0	1,236		7	68	0	1,764
Giant Red Sugar Beet.....	Bruce.....	60	3	1,700	0	1,220					
Danish Sludstrup.....	D. & F.....	97	3	60	0	913		7	1,528	0	1,846
Yellow Intermediate.....	C.E.F.....	99	2	1,480	0	905					
Danish Sludstrup.....	McDonald.....	95	2	1,800	0	894		7	940	0	1,886
Red Globe.....	Ewing.....	99	2	920	0	780		6	1,728	0	1,803
Eclipse.....	McKenzie.....	98	2	400	0	627					

## DATE OF SEEDING MANGELS

The object of this experiment is to compare the results from different dates of seeding. The variety used was Yellow Intermediate. The seed was sown at intervals of seven days, commencing on June 11. The roots were harvested on October 14.

The results are as follows:—

DIFFERENT DATES OF SEEDING MANGELS

Date of Seeding 1929	Yield per acre						
	1929			Average 1927-29			
	Green weight		Dry weight	Green weight		Dry weight	
	ton	lb.	lb.	ton	lb.	ton	lb.
June 11.....	4	1,260	1,468	10	1,753	1	688
June 18.....	2	880	853	9	53	1	429
June 25.....	1	1,180	558	6	1,733	0	1,680
July 2.....	1	1,220	579	5	587	0	1,395
July 9.....	0	1,120	199	3	920	0	862
July 16.....				1	1,207	0	403

It may be noted that the yield decreased as the seeding became later.

SWEDE TURNIPS

Thirty-one varieties were under test. The seed was sown on June 13, and the plants were thinned to 12 inches apart in the row, although there were very few of the plots on which there was an entirely full stand. The plots were harvested from October 1 to 7. The results are as follows:—

RESULTS OF VARIETY TEST WITH SWEDE TURNIPS

Variety	Source of seed	Yield per acre							
		1929			Average 1924-29				
		Green weight		Dry weight	Green weight		Dry weight		
		ton	lb.	ton	lb.	ton	lb.	ton	lb.
Olsgaard Bangholm.....	Hartman.....	13	1,140	1	1,224				
Bangholm.....	Kentville.....	11	740	1	1,023				
Improved Yellow Swedish.....	G. Swedish.....	11	1,260	1	1,003	13	1,533	1	603
Bangholm.....	G. Swedish.....	11	780	1	847	12	1,257	1	461
Mustrola.....	Hartman.....	12	0	1	760				
Improved Hall's Westbury.....	Bruce.....	11	1,280	1	725				
Cornings Green Top.....	Yarmouth.....	10	1,420	1	685				
Bangholm Klank.....	Hartman.....	10	140	1	669				
Bangholm.....	Nappan.....	9	1,800	1	652				
Elephant or Monarch.....	Bruce.....	11	860	1	618				
Kangaroo.....	Bruce.....	10	940	1	425	10	697	0	1,884
Halewoods Bronze Top.....	Steele-Briggs.....	11	520	1	416				
Magnum Bonum.....	Bruce.....	9	1,780	1	413	10	1,733	1	92
Bangholm.....	Ewing.....	9	1,820	1	340	10	1,560	1	86
Canadian Gem.....	Steele-Briggs.....	10	400	1	298				
White Swede.....	Bruce.....	10	60	1	240	11	470	1	193
Ditmars.....	McNutt.....	10	380	1	239	12	880	1	107
Canadian Gem.....	Bruce.....	10	20	1	228	10	1,610	1	19
Jumbo.....	Steele-Briggs.....	9	1,160	1	198	11	567	1	90
Kangaroo Green Top.....	Steele-Briggs.....	9	1,140	1	176	10	1,090	1	22
Selected Purple Top.....	Steele-Briggs.....	9	900	1	172	12	1,497	1	404
Hartley's Bronze Top.....	Bruce.....	7	1,600	1	170	9	710	0	1,091
Elephant or Monarch.....	Ewing.....	9	240	1	94				
New Perfect.....	Bruce.....	9	120	1	76	10	1,804	1	6
White Butter.....	Hartman.....	8	760	1	72				
Derby Green Top.....	Bruce.....	8	660	0	1,907	10	610	0	1,982
Good Luck.....	Steele-Briggs.....	7	1,160	0	1,841	10	233	0	1,898
Purple Top.....	C.E.F.....	8	1,640	0	1,788				
Hazards Improved Bronze Top.....	Steele-Briggs.....	7	100	0	1,586	9	1,553	0	1,982
Hartley's Bronze Top.....	Graham.....	3	1,800	0	1,038				
Shepherds Golden Globe.....	Hartman.....	3	1,200	0	874				

## DATE OF SEEDING SWEDE TURNIPS

The object of this experiment is to compare the results from different dates of seeding. Bangholm was the variety used. The seed was sown at intervals of seven days commencing on June 11. The roots were harvested on October 8. The results are as follows:—

RESULTS FROM DIFFERENT DATES OF SEEDING SWEDE TURNIPS

Date of seeding 1929	Yield per acre							
	1929		Average 1927-29					
	Green weight	Dry weight	Green weight	Dry weight				
	ton	lb.	ton	lb.	ton	lb.		
June 11.....	13	80	1	1,154	11	373	1	471
June 18.....	8	1,780	1	254	9	1,020	1	129
June 25.....	6	160	0	1,565	6	1,673	0	1,599
July 2.....	4	340	0	1,174	4	1,173	0	1,126
July 9.....	2	280	0	596	2	1,967	0	725
July 16.....	0	1,080	0	166	1	1,073	0	365

It may be noted that the earlier seedings have given the larger yields.

## FALL TURNIPS

Fourteen varieties were under test. The seed was sown on June 14, and the plants were thinned to 12 inches apart in the row. The plots were harvested from September 25 to 28. The results are as follows:—

RESULTS OF VARIETY TEST WITH FALL TURNIPS

Variety	Source of seed	Yield per acre							
		1929		Average 1924-29					
		Green weight	Dry weight	Green weight	Dry weight				
		ton	lb.	ton	lb.	ton	lb.		
Purple Top Mammoth.....	Steele-Briggs.....	19	1,320	1	903	17	1,030	1	238
Pomeranian White Globe.....	Steele-Briggs.....	17	1,980	1	572	16	1,241	1	322
Green Top Yellow Aberdeen..	Ewing.....	16	200	1	531	13	1,950	1	160
Devonshire Greystone.....	Steele-Briggs.....	13	80	1	501	18	873	1	297
Early Six Weeks.....	Sutton.....	18	1,040	1	494	17	1,432	1	83
Fynsk Bortfelder.....	D.L.F.....	16	0	1	477				
Purple Top Mammoth.....	Sutton.....	17	500	1	453	18	660	1	289
White Globe.....	Ewing.....	19	1,160	1	387	17	190	1	182
Aberdeen Purple Top.....	Steele-Briggs.....	14	1,660	1	371	15	1,107	1	292
Dales.....	D.L.F.....	14	180	1	367				
Purple Top Aberdeen.....	Sutton.....	14	1,420	1	287				
Hardy Green Round.....	Sutton.....	15	720	1	244	16	1,106	1	237
Yellow Tankard.....	D.L.F.....	13	340	1	182				
Red Paragon.....	Sutton.....	13	1,180	1	35	17	756	1	239

## DATE OF SEEDING FALL TURNIPS

The object of this experiment is to ascertain what date or dates of seeding will give the largest yields and be the most satisfactory generally. Hardy Green Round was the variety used. The seed was sown at intervals of seven days, commencing on June 11. The roots were harvested from September 28 to 30.



The results are as follows:—

RESULTS FROM DIFFERENT DATES OF SEEDING FALL TURNIPS

Date of seeding 1929	Yield per acre							
	1929		Average 1924-29					
	Green weight	Dry weight	Green weight	Dry weight				
	ton	lb.	ton	lb.	ton	lb.	ton	lb.
June 11.....	22	1,400	1	1,626	21	500	1	984
June 18.....	14	560	1	409	17	1,860	1	512
June 25.....	10	1,940	0	1,896	14	1,370	1	150
July 2.....	8	1,240	0	1,565	10	1,940	0	1,596
July 9.....	5	780	0	1,036	9	730	0	1,331
July 16.....	2	1,920	0	608	5	1,643	0	850

Even though fall turnips are rapid growers and are better adapted to late seeding than Swedes, nevertheless, they will give the best results when seeded reasonably early, as is plainly indicated by the figures in the above table.

#### FIELD CARROTS

Fourteen varieties were under test. The seed was sown on June 15, and the plants were thinned to about 4 inches apart in the row. They were harvested on October 15. The results are as follows:—

RESULTS OF VARIETY TEST WITH FIELD CARROTS

Variety	Source of seed	Yield per acre					
		1929		Average 1924-29			
		Green weight	Dry weight	Green weight	Dry weight		
		ton	lb.	ton	lb.	ton	lb.
Large White Belgian.....	Steele-Briggs.....	3	1,880	931	4	880	948
Mammoth Intermediate White	Bruce.....	3	1,840	841	5	297	1,031
Improved Short White.....	Steele-Briggs.....	3	1,600	824	5	1,377	1,082
Long Orange.....	Bruce.....	3	120	774	3	177	750
White Belgian.....	Bruce.....	3	312	744	4	1,297	969
White Belgian.....	D. & F.....	3	240	723	4	497	918
Champion.....	Hartman.....	2	1,840	665	3	1,440	811
Long Red Surrey.....	Steele-Briggs.....	2	800	621	.....	.....	.....
White Belgian.....	Hartman.....	2	880	589	4	1,393	1,004
James.....	D.L.F.....	2	160	554	.....	.....	.....
Long Orange Belgian.....	Bruce.....	2	160	524	3	1,023	833
Champion.....	G. Swedish.....	2	160	499	.....	.....	.....
Danish Champion.....	C.E.F.....	2	120	480	4	23	880
Large White Vosges.....	Bruce.....	2	0	474	.....	.....	.....

#### DATE OF SEEDING FIELD CARROTS

The object of this experiment is to ascertain what date or dates of seeding will give the best results. Improved Short White was the variety used. The seed was sown at intervals of seven days commencing on June 11. The roots were harvested on October 14. The results are as follows:—

## RESULTS FROM DIFFERENT DATES OF SEEDING FIELD CARROTS

Date of seeding 1929	Yield per acre							
	1929				Average 1927-1929			
	Green weight		Dry weight		Green weight		Dry weight	
	ton	lb.	ton	lb.	ton	lb.	ton	lb.
June 11.....	6	500		1,398	8	1,507		1,598
June 18.....	4	1,820		1,122	8	833		1,480
June 25.....	3	60		723	6	747		1,189
July 2.....	2	440		524	4	353		763
July 9.....	0	1,420		170	1	1,520		334
July 16.....					0	1,133		106

## LEGUMES AND GRASSES

## HAY PRODUCTION FROM GRASSES ALONE AND IN COMBINATION WITH CLOVERS

The objects of this experiment are to compare the results in yield and quality of hay produced from timothy, orchard grass, and meadow fescue grown alone and in mixtures, and when these grasses are sown alone and in combination with red clover, alsike clover, and red and alsike clover.

In 1927 this experiment was seeded on May 30, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. In 1928 it was again seeded on May 25 in a similar manner. The results in 1929 from these two seedings and also the average results from the 1923-27 seedings are shown in the following table:—

## HAY PRODUCTION FROM GRASSES ALONE AND IN COMBINATION WITH CLOVERS

Seed sown per acre					Yield per acre											
Red clover	Alsike clover	Timothy	Meadow fescue	Orchard grass	Second-year meadow, 1929		First-year meadow, 1929		Average first and second-year meadow, 1924-29							
					Dry weight	Cured hay containing 15 per cent moisture	Dry weight	Cured hay containing 15 per cent moisture	Dry weight	Cured hay containing 15 per cent moisture	Dry weight	Cured hay containing 15 per cent moisture				
lb.	lb.	lb.	lb.	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.		
	10		8		1	1,190	1	1,753	1	794	1	1,287	1	1,564	2	193
	10			15	1	611	1	1,072	1	456	1	889	1	1,254	1	1,828
	10				0	1,958	1	304	0	1,713	1	15	1	743	1	1,227
	10		6	10	1	1,079	1	1,622	1	525	1	971	1	1,301	1	1,884
	10		6	10	1	817	1	1,314	1	332	1	744	1	1,169	1	1,728
	10			10	1	98	1	468	1	79	1	446	1	820	1	1,318
	6		8		1	1,369	1	1,964	1	1,146	1	1,701	1	1,537	2	161
	6			15	1	469	1	905	1	849	1	1,352	1	935	1	1,453
	6			15	0	1,756	1	66	1	702	1	1,179	1	795	1	1,288
	6			10	1	991	1	1,519	1	1,580	2	212	1	1,225	1	1,794
	6		6	10	1	493	1	933	1	1,145	1	1,700	1	961	1	1,484
	6		6	10	1	42	1	402	1	1,008	1	1,539	1	792	1	1,285
	8		8		1	578	1	1,033	1	1,061	1	1,601	1	1,268	1	1,833
	8			15	1	36	1	395	1	770	1	1,259	1	1,008	1	1,589
	8			15	0	1,720	1	24	1	355	1	771	1	766	1	1,254
	8		6	10	1	599	1	1,058	1	947	1	1,467	1	1,236	1	1,807
	8		6	10	1	580	1	1,035	1	524	1	969	1	1,318	1	1,904
	8			10	1	361	1	778	1	622	1	1,085	1	1,157	1	1,714
					1	163	1	545	1	711	1	1,189	1	976	1	1,601
			12		0	1,642	0	1,932	1	616	1	1,078	1	225	1	618
				30	0	1,133	0	1,333	0	1,500	0	1,765	0	1,728	1	33
			8	15	0	1,912	1	249	1	132	1	508	1	333	1	745
			8	15	0	1,784	1	99	0	1,857	1	185	1	323	1	733
				15	0	1,489	0	1,752	0	1,923	1	262	1	223	1	615

In order to make possible a more direct comparison between the different sorts and mixtures under test, the following table has been prepared:—

AVERAGE OF THE DIFFERENT MIXTURES

Plots averaged	Average yield per acre from first and second-year meadow, 1924-29			
	Dry weight		Cured hay containing 15 per cent moisture	
	ton	lb.	ton	lb.
Where red clover is the base (6 plots).....	1	1,142	1	1,696
Where alsike clover is the base (6 plots).....	1	1,041	1	1,578
Where red and alsike mixed are the base (6 plots).....	1	1,124	1	1,675
Where no clover is used (6 plots).....	1	301	1	707
Where timothy is included (4 plots).....	1	1,334	1	1,922
Where meadow fescue is included (4 plots).....	1	856	1	1,360
Where orchard grass is included (4 plots).....	1	508	1	951
Where timothy and meadow fescue are included (4 plots).....	1	1,024	1	1,558
Where timothy and orchard grass are included (4 plots).....	1	943	1	1,462
Where meadow fescue and orchard grass are included (4 plots).....	1	748	1	1,233

The figures in these tables indicate that reasonably good yields may be obtained from any of the various mixtures under test. Comparing the three different grasses, however, it is found that the timothy is apparently superior to either meadow fescue or orchard grass, particularly the latter, both when grown alone and in the various mixtures.

On the average, the mixtures containing red clover have given the largest yields, followed by those containing red and alsike clover, and alsike clover alone. The mixtures where no clover is used have given the lowest yields.

TIMOTHY AND CLOVERS FOR HAY PRODUCTION

The objects of this experiment are to compare the results in yield and quality of hay produced by seeding with various quantities of timothy, red clover, and alsike clover, and to ascertain to what extent red clover may be profitably replaced with alsike in the standard hay mixtures.

In 1927 this experiment was seeded on June 4, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nursecrop. In 1928 it was seeded on May 29 in a similar manner. The results in 1929 from these two seedings, and also the average results from 1923-27 seedings, are shown in the following table:—

RESULTS FROM TESTS OF TIMOTHY AND CLOVERS FOR HAY PRODUCTION

Seed sown per acre			Yield per acre											
Timothy	Red clover	Alsike clover	Second-year meadow 1929				First-year meadow 1929				Average, first and second-year meadow, 1924-29			
			Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
lb.	lb.	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.
8	10	.....	1	1,852	2	532	1	560	1	1,012	1	1,420	2	24
8	8	2	1	1,156	1	1,713	1	864	1	1,369	1	1,524	2	146
8	6	3	1	1,677	2	326	1	806	1	1,301	1	1,563	2	192
8	4	4	1	1,569	2	199	1	943	1	1,462	1	1,412	2	14
8	2	5	1	1,683	2	333	1	885	1	1,394	1	1,364	1	1,958
6	10	.....	1	1,288	1	1,868	1	781	1	1,272	1	1,360	1	1,958
6	8	2	1	1,182	1	1,744	1	874	1	1,381	1	1,499	2	116
6	6	3	1	1,348	1	1,939	1	971	1	1,495	1	1,344	1	1,934
6	4	4	1	1,569	2	199	1	587	1	1,044	1	1,337	1	1,926
6	2	5	1	1,784	2	452	1	499	1	940	1	1,374	1	1,969

The figures in this table would seem to indicate that timothy, red clover, and alsike clover may be each or all varied considerably in a hay mixture without materially affecting the yield obtained. According to these figures, however, 2 to 4 pounds of red clover may be profitably replaced by alsike.

#### LATE AND EARLY CLOVER WITH LATE AND EARLY GRASS

The object of this experiment is to compare the results in yield and quality of hay produced from a mixture of late and early clover and late and early grass.

This experiment was seeded in 1927 in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. In 1928 it was repeated in a similar manner. The results to date are as follows:—

#### RESULTS FROM LATE AND EARLY CLOVER WITH LATE AND EARLY GRASS

Seed sown per acre				Yield per acre											
Timothy	Meadow fescue	Early red clover	Late red clover	Second-year meadow 1929				First-year meadow 1929				Average, first and second-year meadow, 1924-29			
				Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
lb.	lb.	lb.	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.
8	.....	10	.....	1	186	1	572	1	591	1	1,048	1	1,332	1	1,920
.....	15	10	.....	0	1,278	0	1,504	1	377	1	749	1	1,068	1	1,609
8	.....	.....	10	1	853	1	1,356	1	636	1	1,101	1	1,524	2	146
.....	15	.....	10	0	1,749	1	58	1	524	1	969	1	1,156	1	1,713

Timothy has been giving somewhat better results than the meadow fescue and the late red is outyielding the early red in the second-year meadow.

#### LATE VERSUS EARLY CLOVER IN STANDARD HAY MIXTURE

The object of this experiment is to compare the results in yield and quality of hay produced from using common red and late red clover in the standard hay mixture.

In 1927 this experiment was seeded in quadruplicate one-fortieth-acre plots using Alaska oats as a nurse-crop. In 1928 it was repeated in a similar manner. The results to date are as follows:—

#### RESULTS FROM LATE VERSUS EARLY CLOVER IN STANDARD HAY MIXTURE

Seed sown per acre				Yield per acre											
Timothy	Alsike clover	Common red clover	Late red clover	Second-year meadow 1929				First-year meadow 1929				Average, first and second-year meadow, 1924-29			
				Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
lb.	lb.	lb.	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.	ton	lb.
8	2	8	.....	1	88	1	456	1	1,727	2	385	1	1,167	1	1,726
8	2	.....	8	1	584	1	1,040	2	969	2	1,846	1	1,349	1	1,940

The late red appears to be giving better results than the early red.

## VARIETY TEST WITH RED CLOVER

The object of this experiment is to compare the results in hardiness, yield, and quality of hay produced from different varieties and strains of red clover procured from various sources.

The results in 1929 are from nine varieties which were seeded on May 31, 1928, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. The results are as follows:—

RESULTS OF VARIETY TEST WITH RED CLOVER—FIRST-YEAR MEADOW

Variety	Yield per acre, 1929			
	Dry weight		Cured hay containing 15 per cent moisture	
	ton	lb.	ton	lb.
Alta Swede.....	1	1,655	2	300
Late Swedish.....	1	1,285	1	1,865
Early Swedish.....	1	825	1	1,324
Châteauguay.....	1	590	1	1,047
Wild Red.....	1	404	1	899
Oxdrift.....	1	394	1	816
Kapuskasing.....	1	211	1	601
Welsh Red.....	1	96	1	466
St. Clet.....	1	56	1	419

## VARIETY TEST WITH WHITE DUTCH CLOVER

The object of this experiment is to compare the results in hardiness and yield from different varieties of White Dutch clover.

The varieties were seeded on May 31, 1928, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop.

The results are as follows:—

RESULTS OF VARIETY TEST WITH WHITE DUTCH CLOVER

Variety	Yield per acre	
	Dry weight	Cured hay containing 15 per cent moisture
	lb.	lb.
Wild White Sutton.....	1,604	1,887
Mammoth White Sutton.....	1,489	1,728
Danish Morso.....	1,314	1,548

White Dutch clover is primarily a pasture plant.

## VARIETY TEST WITH TIMOTHY

The object of this experiment is to compare the results in yield and quality of hay produced from different varieties and strains of timothy.



increase in yield is sufficient to justify the adoption of this method on a large scale, as it means the loss of one season's crop, and there is also a greater tendency for the weeds to become established where no nurse-crop is present.

#### NITRO-CULTURE ON ALFALFA

The object of this experiment is to compare the results in yield and quality of hay produced from alfalfa when seeded with and without nitro-culture treatment.

In 1927 this experiment was seeded in quadruplicate one-fortieth-acre plots at the rate of 20 pounds per acre without a nurse-crop. During the winter 1928-29, however, these plots were killed, so that the results in 1929 are from a series of plots seeded on May 30, 1928, in a similar manner. The results are as follows:—

#### RESULTS FROM NITRO-CULTURE ON ALFALFA

Treatment	Yield per acre											
	First-year meadow 1929				Average first-year meadow 1924-29				Average, second-year meadow 1925-28			
	Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
	tons	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.
Treated.....	2	610	2	1,423	2	248	2	998	2	437	2	1,220
Untreated.....	2	534	2	1,334	1	1,955	2	653	2	365	2	1,136

#### VARIETY TEST WITH ALFALFA

The object of this experiment is to compare the results in hardiness, yield, and quality of hay produced from different varieties and strains of alfalfa.

In 1927 eight varieties were seeded on June 1, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. In 1928 the experiment was repeated in a similar manner with seven varieties.

The 1927 seeding was killed out during the winter of 1928-29, so that the yields as reported are from the series seeded in 1928. The results are as follows:—

#### RESULTS OF VARIETY TESTS OF ALFALFA

Variety	Yield per acre first-year meadow, 1929			
	Dry weight		Cured hay containing 15 per cent moisture	
	tons	lb.	tons	lb.
Baltic, D.I.S.Co.....	2	119	2	846
Grimm, Alta Seed Growers.....	2	15	2	724
Variogated, Peel.....	1	1,951	2	648
Grimm, A. B. Lyman.....	1	1,879	2	564
Cossack, Par. Alfalfa Farm.....	1	1,793	2	462
Cossack, D.I.S. Co.....	1	1,482	2	96
Falcata, Par. Alfalfa Farm.....	1	1,119	1	1,669

## NITRO-CULTURE ON RED CLOVER

The object of this experiment is to compare the results from red clover when seeded with and without nitro-culture treatment. In 1928 this experiment was seeded in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. The results are as follows:—

## RESULTS FROM NITRO-CULTURE ON RED CLOVER

Treatment	Yield per acre from first-year meadow							
	1929				Average 1924-29			
	Dry weight		Cured hay containing 15 per cent moisture		Dry weight		Cured hay containing 15 per cent moisture	
	tons	lb.	tons	lb.	tons	lb.	tons	lb.
Treated.....	1	774	1	1,264	1	1,013	1	1,545
Untreated.....	1	814	1	1,311	1	1,084	1	1,628

## PRODUCTION OF SEED

## RED CLOVER SEED PRODUCTION

The objects of this experiment are to compare the results in yield and quality of seed produced from using first or second cutting of red clover for seed production; and also to compare the yields of seed from seeding broadcast, in rows 12 inches apart, and in rows 24 inches apart, and also to compare the monetary returns from red clover used as a hay crop versus when used as a seed crop.

The series which was harvested in 1929 was seeded on June 2, 1928, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. The results are as follows:—

## RED CLOVER SEED PRODUCTION RESULTS IN 1929

Method of seeding and purpose of crop	Yield per acre			Value of crop
	Of seed	Of hay and clover straw		
	lb.	tons	lb.	\$ cts.
Broadcast, two cuttings for hay.....		1	1,499	26 24
Broadcast, first cutting for hay, second for seed.....		1	878	21 71
			1,080	
Broadcast, first cutting for seed.....	46	1	150	12 43
Rows 12 inches apart, first cutting for seed.....	49	1	200	11 60
Rows 24 inches apart, first cutting for seed.....	46	1	180	10 97

The second crop failed to give any seed.

The yields of seed are unusually light, but it may be noted that they are practically the same from the three different methods of seeding. In view of this fact the broadcast method would appear to be the best method to employ as there is less tendency for the weeds to become established than where the seed is sown in rows.

With hay valued at \$15 per ton, clover straw at \$3 per ton, and clover seed at 20 cents per pound, the hay has given the better returns. It should be remembered, however, that the season was particularly unfavourable for the production of clover seed.



## ALSIKE SEED PRODUCTION

The object of this experiment is to compare the results in yield and quality of seed produced from alsike when sown with and without a nurse-crop and also when sown at different dates.

In 1928 the first series of this experiment was seeded on June 1, the second on June 15, and the third on June 29, in quadruplicate one-fortieth-acre plots, using Alaska oats as a nurse-crop. The rate of seeding was 5 pounds per acre. The results in 1929 are as follows:—

ALSIKE SEED PRODUCTIONS, RESULT IN 1929

Date of seeding	Yield per acre, 1929			
	Seeded with nurse-crop		Seeded without nurse-crop	
	bush.	lb.	bush.	lb.
Seeded June 1.....	1	5	0	43
Seeded June 15.....	1	54	0	50
Seeded June 29.....	0	51	0	40

The yield of seed this year was abnormally light.

## TIMOTHY SEED PRODUCTION

The object of this experiment is to compare the results in yield and quality of seed produced from seeding broadcast in combination with red clover, broadcast alone, in rows 12 inches apart, and in rows 24 inches apart.

The plot seeded with a mixture of timothy and red clover is cut for hay the first year and saved for seed the second, the idea being that the red clover will have largely died out and consequently the stand would be mostly timothy.

In 1927 this experiment was seeded in quadruplicate one-fortieth-acre plots. In 1928 it was repeated in a similar manner. The results to date are as follows:—

TIMOTHY SEED PRODUCTION, RESULT IN 1929

Method	Seed sown per acre	Yield per acre							
		Seeded 1928 yield 1929		Seeded 1927 yield 1929		Five-year average first-year crop		Six-year average second-year crop	
		bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.
Broadcast, timothy.....	10								
Broadcast, red clover.....	8			4	9			4	24
Broadcast, timothy.....	10	2	8	4	9	4	2	5	4
Rows 12 inches apart.....		2	20	4	9	3	38	4	43
Rows 24 inches apart.....		2	20	4	2	3	19	5	4

The seed produced the second year from the plots that were sown with red clover and timothy has usually been more or less of a mixture as a percentage of the red clover remained in the plot. On the other hand a good crop of hay is obtained from the mixed plot during the first year and the seed harvested the second year can in most cases be satisfactorily separated with a good fanning mill as these seeds differ considerably both as to size and weight. In this way it might often be possible to avoid buying a supply of timothy seed by saving a selected area that had produced a crop of mixed hay the previous year.

The average results show that there is not a very great difference between that seeded broadcast and in rows and considering the fact that fields sown in rows are more apt to become weedy unless cultivated, which would take extra time and naturally add to the cost of production, it would appear as though the broadcast method is to be preferred.

It is quite evident that the second-year meadow tends to give a larger yield of seed than does the new meadow.

### FERTILIZER EXPERIMENTS

The object of this experiment is to determine to what extent commercial fertilizers including nitrate of soda, superphosphate, muriate of potash and basic slag may be economically employed for the growing of grain, hay and silage crops on clay soil in Northern Ontario. The various fertilizer materials used are applied to the first crop under the following rotation: First year, O.P.V.; second year, barley; third year, clover hay; and fourth year, mixed hay.

For this test an area of clay-loam soil which appeared fairly uniform was selected in the autumn of 1925 and fall-ploughed. This was sown to O.P.V. in 1926 and after this crop was harvested the land was again fall-ploughed in preparation for the nurse-crop of barley in 1927. The grass and clover mixture included timothy 8 pounds, red clover 8 pounds and alsike clover 2 pounds per acre.

The second, third and fourth areas in this experiment were treated in a similar manner to the first. In 1929 all crops were represented namely O.P.V., barley, clover hay and mixed hay.

The total quantities of fertilizer are applied the same time as the seed is sown with the exception of the nitrate of soda, which is divided into two applications about one month apart.

This experiment will be continued for several cycles of the rotation, before any reliable conclusions can be drawn.

### POULTRY

Barred Plymouth Rock is the breed of hens kept at this Station. This breed seems to meet the requirements of a general purpose hen very well.

The prices charged per hundred pounds for the various feeds used during the year are based on the average market prices which are as follows:—

Wheat, \$2.48; oats, \$2.08; whole barley, \$2.40; ground barley, \$2.49; cracked corn, \$2.57; ground corn, \$2.59; bran, \$1.42; middlings, \$1.78; neat meal, \$5.40; beef scrap, \$5.42; skim-milk, \$0.50; oyster-shell, \$2.18; grit, \$1.76; charcoal, \$3.74 and clover leaves \$1.

### SKIM-MILK VERSUS BEEF SCRAP

The object of this experiment is to compare the results from the use of skim-milk and beef scrap as a source of animal protein for winter egg production. In 1928-29 this test was commenced on November 1, and continued until April 30. One hundred pullets were used. These were divided into two pens of 50 birds each. The ration given to each pen was the same with the exception of the skim-milk and beef scrap. The scratch grain consisted of two parts each of whole wheat and cracked corn and one part each of whole oats and barley. The dry mash was made up of equal parts of bran, middlings, corn meal, ground oats and ground barley. The beef scrap was fed from a hopper and the skim-

milk from a drinking vessel. Mineral matter, charcoal and green feed were also supplied to each lot. The results are as follows:—

## SKIM-MILK VERSUS BEEF SCRAP

Items		Skim- milk 1929	Beef scrap 1929	Skim- milk five-year average	Beef scrap five-year average
Number of birds.....	No.	50	50	50	50
Weight at beginning Nov. 1.....	lb.	270	275	240.0	235.4
Weight at finish April 30.....	lb.	290	301	275.4	275.2
Pounds of scratch.....	lb.	1,797	1,709	1,677.4	1,693.4
Pounds of mash.....	lb.	630	747	567.0	599.4
Pounds of green feed.....	lb.	318	283	331.6	317.6
Pounds of milk.....	lb.	1,229		1,355.0	
Pounds of beef scrap.....	lb.		163		117.0
Pounds of grit.....	lb.	69	37	36.5	25.4
Pounds of oyster shell.....	lb.	105	98	89.6	72.2
Pounds of charcoal.....	lb.	17	13	11.2	11.2
Number of eggs laid.....	No.	5,116	5,105	4,741.8	4,696.8
Cost of animal feed.....	\$	6 15	8 83	6 78	6 12
Total cost of feed.....	\$	70 18	71 93	73 42	73 24
Value of eggs laid.....	\$	255 80	255 25	237 09	234 81
Cost per doz.....	\$	0 16	0 17	0 19	0 19
Profit.....	\$	185 62	183 32	163 67	161 63

The figures in this table show that there is very little difference between the results obtained from skim-milk and beef scrap. This would seem to indicate that farmers who have a supply of skim-milk would not benefit materially by purchasing other animal feed for their poultry, while those who may not have any skim-milk may use beef scrap to equally good advantage.

## LIGHTS VERSUS NO LIGHTS

The object of this experiment is to compare the results in egg production by the use of electric lights from four o'clock in the morning until daylight, and the results without lights.

This test has been conducted for six years, using 100 pullets in each year. In 1928-29 it was commenced on November 1, and continued until April 30. The birds were divided equally into two pens of 50 each. All conditions were made similar except that the one pen had these extra hours of light to work. The results are as follows:—

## LIGHTS VERSUS NO LIGHTS—RESULTS FROM NOVEMBER 1 TO APRIL 30

Items		Lights, 1929	No lights, 1929	Lights, six-year average	No lights, six-year average
Number of birds.....	No.	50	50	50	50
Weight at beginning Nov. 1.....	lb.	246	250	221.0	226.5
Weight at finish April 30.....	lb.	276	270	262.2	261.2
Pounds of scratch.....	lb.	1,637	1,515	1,600.3	1,637.8
Pounds of mash.....	lb.	615	534	506.0	451.3
Pounds of green feed.....	lb.	283	273	293.7	298.7
Pounds of milk.....	lb.	869	842	630.2	618.2
Pounds of meat scrap.....	lb.	145	77	104.0	94.8
Pounds of grit.....	lb.	35	22	21.8	18.6
Pounds of oyster shell.....	lb.	96	70	70.7	65.0
Pounds of charcoal.....	lb.	18	12	15.2	10.0
Number of eggs laid.....	No.	4,267	4,088	4,016.0	3,731.8
Total cost of feed.....	\$	72 78	62 95	68 26	67 16
Value of eggs laid.....	\$	213 35	201 90	200 80	186 59
Cost per dozen.....	\$	0 20	0 19	0 20	0 22
Profit.....	\$	140 57	138 95	132 54	119 43

Over a six-year period the pen with lights laid 274 eggs more than the pen without lights. These extra eggs are also obtained when the price is usually higher.

#### EFFECT OF SUPPLEMENTARY FEEDS ON FERTILITY, HATCHABILITY AND VIABILITY

The object of this experiment is to determine the effect upon fertility, hatchability and viability when supplementary feeds including cod liver oil, raw liver, bone meal and a mixture of the former two are added to the regular ration given to the breeding stock.

In 1929 this test included 70 pedigree hens which were divided into ten pens of 7 birds each, making duplicate pens for each feed under test as well as for the check pen which received the ordinary ration.

The cod liver oil was fed at the rate of one-quarter teaspoonful per bird per day; the raw liver one-half ounce per bird per day and the bone meal was mixed in the dry mash at the rate of 5 per cent by weight. For the pen receiving both the cod liver oil and raw liver the quantity of each was reduced one-half.

In order to eliminate any effect caused by the different males used, the experiment was divided into two periods with one week between. The first period covered the regular pedigree mating season when the male birds were kept continuously in their respective pens, while the second period the male birds were alternated daily. During the first period 906 eggs were set and 481 during the second period. Separate records were kept for each of these two periods.

In 1929 the number of eggs required per chick at three weeks for each of the feeds under test is as follows: cod liver oil and raw liver, 1.7; raw liver, 2.3; cod liver oil, 2.6; bone meal, 3; and ordinary ration, 3.1. Over a four-year period the figures are: raw liver, 2.2; cod liver oil and raw liver, 2.4; ordinary ration, 2.6; bone meal, 2.7; and cod liver oil, 3.

#### HATCHING RESULTS FROM DIFFERENT DATES OF SETTING

Each year the hatching season covers a period of around three months and includes settings which are made during the months of March, April and May.

The results obtained from those set during each of these different months are shown in the following table:—

HATCHING RESULTS FROM DIFFERENT DATES OF SETTING

Month set	Number of eggs set	Per cent fertile	Per cent total eggs hatched	Per cent fertile eggs hatched	Per cent chicks hatched alive when wing banded	Total eggs required for one chick hatched	Total eggs required for one chick at three weeks
	No.	%	%	%	%	No.	No.
March, 1929.....	1,695	84.4	43.5	51.6	90.9	2.30	2.53
Average 6 years.....	1,028	86.5	46.2	53.4	80.2	2.16	2.70
April, 1929.....	2,283	91.2	54.4	59.6	88.7	1.84	2.07
Average 6 years.....	1,517	92.6	50.1	54.1	86.2	2.00	2.32
May, 1929.....	1,716	90.3	51.7	57.3	85.5	1.93	2.26
Average 6 years.....	847	90.9	49.7	54.7	83.8	2.01	2.40

#### COST OF ARTIFICIAL INCUBATION

With the object of determining the amount of fuel required and consequently the cost of hatching, records were kept of the amount of coal oil used

by each of the three No. 5 Buckeye machines which were in use. The following table gives the details of the test:—

COST OF ARTIFICIAL INCUBATION

Items		1929	Average 4 years
Number of settings.....	No.	10	6.3
Number of eggs.....	No.	5,694	3,539
Oil used.....	gal.	59.9	37.3
Cost of fuel.....	\$	20.97	13.06
Cost per 100 eggs.....	\$	0.37	0.37

COAL REQUIRED TO OPERATE BROODER STOVE

The object of this experiment is to determine the quantity and cost of coal required to operate the No. 118 Buckeye brooder stove and the No. 119 brooder stove of the same make. The No. 118 brooder is rated at a capacity of 500 chicks while the No. 119 is rated at 1,000 chicks. The following table gives the details of the test:—

COAL REQUIRED TO OPERATE BROODER STOVE

Items	Brooder No. 118			Brooder No. 119		
	April	May	June	April	May	June
Coal used per month..... lb.	373	476	384	498	547	552
Coal used per day..... lb.	12.6	15.4	12.8	16.6	17.6	18.4
Value of coal used..... \$	3.73	4.76	3.84	4.98	5.47	5.52
Capacity of brooder..... No.	500	500	500	1,000	1,000	1,000
Cost per 100 chicks per month.... \$	0.75	0.85	0.77	0.50	0.55	0.55

RATIONS

The formulation of feed mixtures containing as large a proportion of the common home grown grains as is consistent with a good ration is an important part of the poultry keepers work on the average farm. The standard scratch ration in use at this Station is composed of two parts each of whole wheat and cracked corn and one part each of whole oats and barley; while the laying mash consists of equal parts of bran, middlings or shorts, corn meal, crushed oats, and ground barley, plus ten per cent meat meal. Oyster-shell, grit, charcoal and in some cases beef scrap are available in hoppers at all times.

During the winter months the birds are given a warm wet mash at noon in troughs, as much as they will clean up readily.

Clover or alfalfa leaves make a very convenient and excellent form of green feed. These may be fed in the litter, from hoppers or steamed and mixed in the wet mash. Mangels, turnips and sprouted oats may also be used to good advantage.

PEDIGREE WORK

The exact egg production of each individual hen is obtained through the medium of the trapnest. Sufficient eggs from each hen are weighed in order to determine the size of eggs produced. These together with the individuality and general type of the birds are used as a basis for utility selection. By this method, only those birds are used for breeding purposes which have pedigrees showing high production of good sized eggs and are also of desirable type.

Particular attention is also given to the selection of the males used, and those whose sisters and daughters prove to be high producers are retained and used for a number of years. The selection of the breeding stock on the basis of production is probably the greatest single factor in increasing the production of the individual birds and, consequently the average of the whole flock.

## BEES

The season of 1929 from the standpoint of honey production was above the average. The bees came through the winter with light losses, although for some reason a considerable amount of spring dwindling occurred later on. This may have been caused, in part at least, by the cold backward weather during the month of May.

### RETURNS FROM APIARY

During the season of 1929 fifteen colonies were used for the production of extracted honey, although some brood was taken from a number of these for the queen-mating yard. The results are as follows:—

#### FINANCIAL STATEMENT OF APIARY IN 1929

Total weight of honey extracted from 15 colonies.....	lb.	2,022.8
Average weight produced per colony.....	lb.	134.9
Selling price of honey per pound.....	\$	0 15
Total value of honey produced.....	\$	303 42
Average value of honey produced per colony.....	\$	20 23

### A STUDY OF HONEY-FLOW

One colony of average strength was kept on scales, with the object of obtaining data relative to the effect of weather conditions on the daily honey-flow.

#### RECORD OF HIVE ON SCALES IN 1929

	May	June	July	Aug.	Sept.	Total
Gain.....			96.0	115.5		182.2
Loss.....	7.3	10.0			12.0	

It may be noted that July and August are the two main months for honey production and as this is usually the case it indicates the extreme importance of having the colonies in the very best possible condition for gathering the nectar when it is available.

### OUTDOOR VERSUS CELLAR WINTERING

The object of this experiment is to compare the results from bees wintered outdoors with those wintered in a cellar.

In the autumn of 1928 nineteen colonies were placed in winter quarters. Sixteen of these were packed in the bee-yard on October 3 and 4, in the following manner: eight in quadruple cases, six in double cases, and two in single cases.

The packing consisted of 6 inches of well-dried planer shavings on the sides and underneath, and about 12 inches on top. Of the sixteen colonies wintered outside fourteen came through alive, all of which were queen-right and had on the average 4.3 frames each of bees. Each colony packed outside had been fed with a sugar syrup made of 2 pounds sugar to 1 of water to a weight of about

80 pounds. For example, if a colony weighs 40 pounds before feeding it is given at least 40 pounds of sugar in the form of syrup.

Three colonies were placed in the office cellar on November 22. These were fed to the same weight as the others, early in the autumn. Of the three colonies put away, one standard colony and one side of the twin hive were alive and had on the average 4.3 frames each of bees.

The bees were removed from the cellar on May 1, which was a week earlier than in 1928. The brood chamber of the colonies taken from the cellar are always packed with three inches of planer shavings, which are left on until after the cool spring weather is over.

When wintering outdoors it is always advisable to provide a good wind-break.

#### FOUR-COLONY VERSUS TWO-COLONY VERSUS SINGLE-COLONY WINTERING CASES

The object of this experiment is to compare the results from wintering bees in four-colony, two-colony and single-colony wintering-cases.

Eight of the colonies wintered outdoors were packed in quadruple, six in double and two in single wintering-cases. The kind and amount of packing in each case was the same. Of the eight in quadruple cases seven came through alive, all of which were queen-right with an average of 3.7 frames each of bees. Of the six in double cases five were alive and queen-right with an average of 4.6 frames each of bees. The two single cases were both alive with an average of 5.5 frames each of bees.

#### WINTERING TWO QUEENS IN ONE HIVE

The object of this experiment is to ascertain the possibility of over-wintering a number of surplus queens to be used the following spring in requeening queenless colonies or replacing weak and failing queens.

In the autumn of 1928, one hive was equipped with a tight-fitting division board, and a double entrance provided. Each side was made quite strong with bees and given a good young queen. This hive was placed in the office cellar, but unfortunately only one queen came through alive. In former years, however, this method of over-wintering some extra queens has been found quite successful.

#### METHODS OF DETECTING PREPARATIONS FOR SWARMING

The object of this experiment is to ascertain if preparations for swarming can be detected by the use of the double brood-chamber, thereby reducing the time required for making examinations.

All colonies were examined every nine or ten days for the presence of queen cells. Four Langstroth hives each had shallow supers added to the brood chamber. These were examined by tipping the supers. If no queen cells containing larvae were found along the lower edges of the combs in the super, the brood-chamber was also examined to see if queen cells had been started. Of the four colonies in this experiment, queen cells were found in the super by tipping, in two, and the other two made no preparations for swarming. This would seem to indicate that the method would be fairly reliable as a means of detecting the swarming fever.

#### PREVENTION OF SWARMING

**SEPARATION OF BROOD AND QUEEN.**—One hive was treated by this method which is as follows: At first appearance of larvae in queen-cells all brood from brood-chamber was removed to upper super, leaving the queen below on a full set of empty combs, with a few young bees. The brood was left to emerge

over the old hive. This method seemed to be quite effective as the queen commenced laying in the empty combs immediately and no further preparations for swarming occurred.

#### PACKAGE BEES AS A MEANS OF STARTING COLONIES

The object of this experiment is to determine the relative value of 2-versus 3-pound packages of bees as a means of starting colonies, and also to compare the results from packages that were given drawn comb versus those given foundation only and to compare them with over-wintered colonies.

On May 22, ten 2-pound and five 3-pound packages were received. On arrival they were fed by painting the screening of the cage with a very thin sugar syrup, and placed in a cool place until evening.

In the evening they were introduced to new hives by two different methods as follows: The cage containing the queen was first removed from the package and introduced by removing the covering over the candy hole and suspending the cage between the top bars of the prepared hive. In one method the package was placed on top of the frames on its side and the bees came out the opening made by the removal of the feed can and went down into the hive. In this case it was necessary to place an empty super on top of the brood chamber. In the other method only five frames were placed in the prepared hive and the package was put down in beside these.

While very little difference could be observed in the rate of building up between the 2- and 3-pound packages, the 3-pound packages gave the larger yields, as did also the 2-pound packages on drawn comb over those on foundation only.

The average yield of honey in pounds from each of the colonies used for honey production are as follows: The 3-pound packages on drawn comb, 162.1; the 2-pound packages on drawn comb, 142.2; the 2-pound packages on foundation, 71.8. The average yield from the regular apiary of over-wintered colonies was 149.1 pounds while the average yield from the packages was 125.4 pounds.

The above figures indicate that colonies can be quite successfully established by securing either 2- or 3-pound package bees even when no drawn comb is available. This latter point is very important because it shows that a beginner can get established without having on hand or purchasing any old equipment whatever, and this materially lessens the danger of getting disease.

#### CARNIOLAN BEES

In 1927 it was decided to establish a small out-apiary of Carniolan bees in order to rear some Carniolan Queens for distribution to other Farms and Stations, and also to make observations on their adaptability to this climate and to compare them with the Italian. This yard was established at Kitigan Station, which is about 6 miles east of Kapuskasing, in order that there would be no crossing between the two yards.

Five colonies were placed in winter quarters in the autumn of 1928, and four came through alive although two were quite weak. These gave an average of 97.9 pounds each of extracted honey, which is not as large as the average of similar colonies of Italians at Kapuskasing. The observations to date, however, would seem to indicate that Carniolan bees are fairly well adapted to this climate and compare favourably with the Italians as honey gatherers.

#### QUEEN REARING

As there are no other apiaries within flying distance of this Station, it is possible to carry on controlled mating of queens. The best queens available



are selected as drone breeders and queen mothers. In this way the purity of the strain as well as the colour and other desirable features are maintained.

Queenless and broodless colonies were used in which to start the queen-cells, and the first grafting was done on July 10.

Ripe queen-cells were given to the mating boxes and as the resultant queens became mated and were laying they were sent to the other Experimental Farms and Stations or used in the Station apiary.

The young queens are carefully selected, so that only the most promising are retained.

During the season seventy-five queens were reared and successfully mated.

### FIBRE CROPS

**VARIETY TEST WITH FLAX.**—Only one variety, J.W.S., was under test. The seed was sown on June 5, in triplicate one-fortieth-acre plots at the rate of  $1\frac{1}{2}$  bushels per acre. The crop was pulled on September 24. The average height was 33 inches and the average yield of dry matter per acre was 2 tons 169 pounds.

**VARIETY TEST WITH HEMP.**—Only one variety, Minnesota No. 8, was under test. The seed was sown on June 5, in triplicate one-fortieth-acre plots at the rate of  $1\frac{1}{2}$  bushels per acre. The crop was harvested on September 24. The average height was 60 inches and the average yield per acre of dry matter was 1 ton 1,724 pounds.

### ILLUSTRATION STATIONS

Twenty Illustration Stations were operated under the supervision of this Station during the year. The operators and locations of these Stations are as follows: A. Brouard, Mattice; Basile Gaudreault, Moonbeam; E. D. Carrere, Cochrane; Olivier Genier, Genier; H. Labreche, Val Gagne; A. Beaudry, Verner; E. Strain, Gore Bay; Wm. McColeman, Spring Bay; Wm. A. Hare, Mindemoya; Jos. Desrochers, La Reine; Jos. Lemoine, Ste. Rose de Poularies; H. Marcotte; Barraute; Eugene Robitaille, Belcourt; Wilfrid Reneault, St. Tite des Caps; A. Gilbert, St. Hilarion; E. Villeneuve, Murray Bay; A. Hebert, Normandin; Jos. Gervais, Hebertville; Emile Brassard, Jonquiere; and Wm. Bolly, Chicoutimi.

On twelve of these Stations a four-year rotation has been established as follows:—

- First year—hoed crops.
- Second year—grain.
- Third year—clover hay.
- Fourth year—mixed hay.

On five the following five-year rotation is in use:—

- First year—hoed crops.
- Second year—grain.
- Third year—clover hay.
- Fourth year—mixed hay.
- Fifth year—hay or pasture.

While on the other three the following six-year rotation is under test:—

- First year—grain.
- Second year—clover seed.
- Third year—hoed crops.
- Fourth year—grain.
- Fifth year—clover hay.
- Sixth year—mixed hay.

In each rotation, immediately after the mixed hay is harvested, the land is ploughed and cultivated occasionally until the freeze-up. This puts the soil in excellent condition for the following crop.

Records are kept of the yields and cost of production of the various crops grown. The varieties of cereals and cultural methods that have been found to give the best results on the Experimental Station are given further test on these Stations and in this way the value of these varieties and cultural methods for different sections is determined.

Registered seed grain, certified potatoes, and pure-bred poultry are produced and made available to the settlers. The Illustration Station is being featured as a means of demonstrating the value of improved farm practices to the farmer.

A detailed report on these Stations may be found in the 1929 report of the Chief Supervisor (Eastern Stations).

EB.

