DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

KAPUSKASING, ONT.

REPORT OF THE SUPERINTENDENT

SMITH BALLANTYNE

FOR THE YEAR 1923

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DOMINION EXPERIMENTAL STATION, KAPUSKASING, ONT.

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THE SEASON

The monthly mean temperatures of the winter months of 1923 were considerably below the average of a six-year period. The cold weather was almost continuous, with practically no reduction in the depth of snow until April 19, when, following three days of bright sunshine and southerly winds, the snow rapidly disappeared. Some potatoes in plot experiments were planted on April 30; flax was sown on May 1, and by May 5, most of the cereal crops had been seeded. This was the earliest seeding yet accomplished in the history of the Station. Following the frost of June 14, which did no damage, there were no further severe drops in temperature until the night of September 9, when the growth of practically all crops was stopped.

The year's precipitation of 21·73 inches was 1·593 inches less than the average for the past six years. From January to May the precipitation was light, but abundant moisture was provided from June to October.

An excellent hay crop was saved under ideal haying conditions and the grain harvest was the largest and most valuable yet produced here.

Fall ploughing continued until November 21, which is a record for this part of Ontario. More remarkable still, is the fact that the ground thawed out again after this frost, so that ploughing operations were possible up to December 1.

METEOROLOGICAL RECORDS—1923

Month	Highest temp.	Lowest temp.	Precipitation	Sunshine
	Degrees F.	Degrees F.	Inches	Hours
January	32	−42	0·3	76·6
February	30	−42	0·46	88·1
March	44	−37	0·6	142·0
April	75	−15	0·87	237·3
May	86	15	0·22	381·9
June	91	27	4·20	256·2
July	90	35	2·1	334·0
August	77	35	3·5	195·6
September	82	29	5·05	140·3
October	69	10	2·65	118·5
November	55	−5	1·00	59·5
December	40	−18	0·75	41·5

ANIMAL HUSBANDRY

In the system of "mixed farming" to which climatic and other conditions in northern Ontario are so well suited, live stock raising, and dairying, must always occupy a prominent place. This branch of farm industry keeps up soil fertility, markets in the most profitable way the farm-grown grains and roughages, makes possible the utilization of rough land as pasture, furnishes employment during the slack season of the year, and last, by no means least, the demand for live stock and dairy products is steady from towns and mining and lumber camps throughout the district.

For the above reasons, experimental work in animal husbandry is a feature at this Station, the objects in view being (1) to ascertain the most suitable feeds and best methods of feeding, housing and handling the various classes of live stock, and (2) to have available at moderate prices, suitable breeding animals for distribution to settlers as foundation stock.

DAIRY CATTLE

While pure-bred dairy bulls have always headed the Station herd, it was not until this year that a start was made with pure-bred females, when five registered Ayrshire cows with calf were purchased in the Lachute district of Quebec. Four of these have already freshened and are all entered in the R.O.P. test. They are typey individuals and should make a fairly good foundation from which to build up a pure-bred herd.

The grade herd of dairy cattle consists of one grade Holstein and ten grade Ayrshire cows, two grade two-year-old Ayrshire heifers, eleven grade yearling Ayrshire heifers and four grade Ayrshire heifer calves. This herd is headed by the herd sire Ottawa Lord Kyle Third, No. 77284 —, a young bull showing considerable promise as an individual and as a breeder. He is out of Flavia of Ottawa 8th —63210— and is sired by the Overton Lord Kyle bull—70090—(18830), imported.

The whole herd, both dairy and beef, has been given full accreditation under the Accredited Herd System.

MILK RECORDS

Each cow's milk is weighed morning and evening during her entire lactation period and the weights are recorded on a monthly milk sheet. A test is also made once per month to determine the percentage of fat which the milk contains. A record is kept of the feed consumed by each animal during her lactation period and for the time during which she was dry previous to freshening. The data are used in figuring out the amount of feed required to maintain an animal for one year, the cost of maintenance and the cost of milk production.

The following table shows the amount of milk produced by each cow that completed her lactation period during the calendar year of 1923. It also shows the cost of feed and the value of the milk produced. Hence the profit column is a comparison between feed and value of milk only, as the calf and labour are both neglected.

The cost of feed is based on the following rates, which are the average cost of production figures for the roughages and market prices for the concentrates.

Ensilage, O.P.V. or Sunflower, per ton	$ 7 00
Roots, per ton	7 00
Hay, per ton	10 00
Meal, per 100 lb	1 75
Pasture, per day	0 10

DAIRY HERD RECORD 1923

Name of cow	Age at beginning of lactation period	Date of dropping calf	Number of days in lactation period	Total pounds of milk produced	Daily average yield milk	Average per cent fat in milk	Value of whole milk at 10 cents per quart	Total cost of feed	Cost per 100 pounds of milk	Profit or loss on cow labour and calf neglected
	yrs.			lb.	lb.	%	$ cts.	$ cts.	$ cts.	$ cts.
White	11	April 21, 1922	382·5	11,916·5	31·1	3·4	476 66	136 45	1 14	340 21
Julia	11	April 21, 1922	542·0	10,085·0	18·6	4·0	403 40	143 75	1 42	259 65
Dewdrop	9	Mar. 7, 1923	294·0	8,485·0	28·8	4·4	339 40	111 82	1 31	227 58
Fleckie B	3	Sept. 11, 1922	381·5	8,399·0	21·1	4·1	335 96	125 94	1 49	210 02
Maggie A	3	Aug. 25, 1922	287·0	7,231·5	25·1	4·5	289 26	126 05	1 74	163 21
Dora A	4	June 13, 1922	342·0	6,854·0	20·00	3·8	274 16	101 40	1 47	172 76
Dewdrop A	2	April 11, 1922	380·0	6,066·0	15·9	4·1	242 64	138 88	2 28	103 76
Bloomer A	2	May 23, 1922	308·0	5,353·0	17·37	4·5	214 12	89 69	1 67	124 43
Whitie A	5	Jan. 17, 1923	286·5	5,351·0	18·67	4·2	214 04	85 98	1 66	128 08
Maggie B	3	Mar. 4, 1923	271·0	5,013·0	18·4	4·0	200 53	92 46	1 84	108 06
Phoebe A	6	Feb. 11, 1923	272·5	4,816·0	17·6	4·4	192 64	85 69	1 77	106 95
Phoebe A.1	2	June 2, 1923	301·0	4,206·5	13·9	3·8	168 26	84 18	2 00	84 08
Phoebe B	3	April 22, 1923	231·5	3,713·0	16·0	4·2	148 52	105 30	2 83	43 22
Totals	64	.....	4,279·5	87,489·5	263·54	53·4	3,499 58	1,427 59	22 62	2,071 99
Averages	4·92	.....	329·2	6,729·9	20·27	4·1	269·19	109·81	1·74	159·38

RATIONS FOR DAIRY COWS

One of the main considerations in formulating rations for dairy cows is to obtain a reasonably good ration and still not have to purchase too many of the products contained therein. Keeping this idea in mind, it is established at the Station that good clover pasture during the summer season is about all that is required. It sometimes pays to give the heavier milking cows a small allowance of grain even on good pasture in order that no decrease in the milk flow will occur.

During the winter months a plentiful supply of good silage, either O.P.V. or sunflower, will go a long way in maintaining the dairy herd. At this Station a small allowance of hay is given, together with all the silage that the cattle can handle and these are supplemented by a meal mixture as follows: bran, four parts; oats, two parts; barley, two parts, and oilcake, two parts.

The ensilage is fed twice daily and the grain is spread over it in order to enhance the palatability. The hay is also fed twice per day.

The individual rations must be varied somewhat and are based on the animal's size, constitution and ability to produce milk. In connection with the grain ration, a general policy is to feed one pound of meal for every three to four pounds of milk being produced. The following might be taken as a representative ration for a cow weighing twelve hundred pounds and producing forty pounds of milk per day:—

Ensilage, O.P.V. or Sunflower	50 lbs. per day
Clover hay	10 " "
Grain composed as above	12 " "

SUNFLOWERS VERSUS O.P.V. SILAGE FOR MILK PRODUCTION

The fact that corn has not been a sure crop in this climate has made it necessary to try to locate a substitute which would give a fair yield per acre and also make a suitable silage for the feeding of live stock. Up to the present

time, two different crops have been used with good success, namely, sunflowers, and oats, peas and vetches.

Both of these crops do remarkably well in this section, and it would appear that they are going to solve the silage problem in northern Ontario. There is little difference in the cost of production per ton of these two silages, but the sunflowers have a slight advantage as a cleaning crop, in that they are planted in drills or hills, and therefore permit of summer cultivation, while on the other hand they take more moisture from the soil. They are both easily harvested, the O.P.V. with a grain binder, and the ensilage cutter will handle them equally well although the O.P.V. seems to be a little harder to blow into the silo. In keeping quality there is not much to choose, although the sunflowers may freeze a little more in the silo than the O.P.V.

The sunflower silage is dark in colour and has a more or less characteristic odour, which seems slightly sweeter than the O.P.V. silage. The O.P.V. silage is of a greenish-brown colour and has an odour very similar to that of corn silage. The O.P.V. in 1922 was cut when about ten per cent of the oats were ripe and the peas about right for table use, while the sunflowers were cut when about twenty per cent in bloom. The O.P.V. and sunflowers were cut into separate silos and this made possible the conducting of several feeding experiments.

In order to determine the relative value of these silages for the production of milk and also to note their palatability, an experiment was commenced at this Station on November 1, 1922. Ten milking cows were selected for this test, which were in such stage of lactation that they would all continue milking throughout the following four thirty-day periods which the experiment was to cover. The cows were all grades and consisted of one Holstein, five Ayrshires and four Shorthorns. They received a uniform ration during the whole period, differing only in the variety and quantity of silage fed as follows:—

Period 1—Nov. 1 to 30, Sunflowers	45	lbs. per day
Period 2—Dec. 1 to 30, O.P.V.	40	" "
Period 3—Dec. 31 to Jan. 29, Sunflowers	45	" "
Period 4—Jan. 30 to Feb. 28, O.P.V.	40	" "

The original intention had been that the silages would also be fed in equal quantities by weight; but on account of the sunflower silage containing so much more moisture, it was found in actual practice that the cattle could handle only about ninety per cent as much of the O.P.V. as they did of the sunflowers, and this is why their silage ration was reduced during the second and fourth periods to forty pounds per day. This gave them practically the same amount of dry matter consumed in each period, which is a fair enough basis of comparison.

The cattle were weighed at the beginning and end of each thirty-day period and the first seven days of each period was taken to transfer from one silage to the other, so that this left them two full days on the unmixed silage before the milk record was considered, which was figured on the latter twenty-one days in each period. Each cow got ten pounds of hay per day, and a grain ration consisting of bran four parts, ground oats two parts, ground barley two parts, oilcake one part and cotton seed meal one part, fed at from eight to twenty pounds per day per cow, depending on the size of the cow, her stage in lactation and the amount of milk she was giving; but the amount remained constant with each animal during the four periods.

In order to eliminate any error which might occur owing to the natural decline in milk flow, the results obtained during periods one and three were averaged and compared with the results obtained in the second period. As a check, in like manner periods two and four were averaged and compared with period three; and for the final results showing the advantage or disadvantage

of each silage, the figures of these two tables were again averaged. The results obtained are as follows:—

SUNFLOWERS VERSUS O.P.V. SILAGE FOR MILK PRODUCTION

Items		Period 1	Period 2	Period 3	Average Periods 1 and 3
Experimental Feeds		Sun-flowers	O.P.V.	Sun-flowers	Sun-flowers
Number of cows in test	No.	10	10	10	10
Pounds of milk produced by 10 cows in 21 days	lbs.	6290·5	5457·0	4964·5	5627·5
Average milk per cow per day	lbs.	29·95	25·98	23·64	26·79
Average per cent fat in milk	%	3·55	3·86	4·34	3·945
Total pounds fat produced by 10 cows in 21 days	lbs.	226·59	207·34	211·573	219·081
Average pounds of fat per cow per day	lbs.	1·07	0·98	1·007	1·04
Total meal consumed in 21 days	lbs.	3171·00	3171·00	3171·00	3171·00
Total hay consumed in 21 days	lbs.	2100·00	2100·00	2100 00	2100·00
Total silage consumed in 21 days	lbs.	9450·00	8400·00	9450·00	9450·00
Meal mixture consumed per 100 pounds fat produced	lbs.	1399·56	1529·37	1498·77	1449·16
Hay consumed per 100 pounds fat produced	lbs.	926·78	1012·82	992·56	959·67
Silage consumed per 100 pounds fat produced	lbs.	4170·50	4051·31	4466·54	4318·52
Meal mixture consumed per 100 pounds milk produced	lbs.	50·40	58·10	63·87	57·13
Hay consumed per 100 pounds milk produced	lbs.	33·38	38·48	42·30	37·84
Silage consumed per 100 pounds milk produced	lbs.	150·22	153·93	190·35	170·28
Findings from Experiment					
Cost of meal mixture	$	55·49	55·49	55·49	55·49
Value of hay fed	$	10·50	10·50	10·50	10·50
Value of silage fed	$	33·08	29·40	33·08	33·08
Total cost of feed	$	99·07	95·39	99·07	99·07
Feed cost to produce 100 pounds fat	$	43·72	46·00	46·82	45·22
Feed cost to produce 100 pounds milk	$	1·57	1·75	1·99	1·78

SUNFLOWERS VERSUS O.P.V. SILAGE FOR MILK PRODUCTION

Items		Period 2	Period 3	Period 4	Average of periods 2 and 4
Experimental Feeds		O.P.V.	Sun-flowers	O.P.V.	O.P.V.
Number of cows in test	No	10	10	10	10
Pounds of milk produced by 10 cows in 21 days	lbs.	5457·0	4964·5	4409·0	4933·00
Average milk per cow per day	"	25·98	23·64	20·99	23·48
Average per cent fat in milk	%	3·86	4·34	3·99	3·92
Total pounds fat produced by 10 cows in 21 days	lbs.	207·34	211·573	172·50	189·92
Average pounds of fat per cow per day	"	0·98	1·00	0·821	0·90
Total meal consumed in 21 days	"	3171·00	3171·00	3171·00	3171·00
Total hay consumed in 21 days	"	2100·00	2100·00	2100·00	2100·00
Total silage consumed in 21 days	"	8400·00	9450·00	8400·00	8400·00
Meal mixture consumed per 100 pounds fat produced	"	1529·37	1498·77	1838·26	1683·81
Hay consumed per 100 pounds fat produced	"	1012·82	992·56	1217·39	1115·10
Silage consumed per 100 pounds fat produced	"	4051·31	4466·54	4869·56	4460·43
Meal misture consumed per 100 pounds milk produced	"	58·10	63·87	71·92	65·01
Hay consumed per 100 pounds milk produced	"	38·48	42·30	47·62	43·05
Silage consumed per 100 pounds milk produced	"	153·93	190·35	190·51	172·22
Findings from Experiment					
Cost of meal mixture	$	55·49	55·49	55·49	55·49
Value of hay fed	$	10·50	10·50	10·50	10·50
Value of silage fed	$	29·40	33·08	29·40	29·40
Total cost of feed	$	95·39	99·07	95·39	95·39
Feed cost to produce 100 pounds fat	$	46·00	46·82	55·29	50·64
Feed cost to produce 100 pounds milk	$	1·75	1·99	2·16	1·95

Average Results From Above Two Tables		Sun-flowers	O.P.V.
Feed cost to produce 100 pounds fat	$	46·02	48·32
Feed cost to produce 100 pounds milk	$	1·88	1·85

Deductions

It will be noted that, according to the results obtained from this experiment, there is little difference in the feeding value of these two silages.

In actual milk production the sunflowers gave a daily advantage per cow of 0·49 pound; but in feed cost to produce 100 pounds of milk the O.P.V. was three cents below the sunflowers. This was caused by the greater quantity of the latter being consumed, while both silages were charged at an equal rate.

In fat content of the milk the sunflowers gave an advantage of 0·25 per cent, and this gave them an advantage of two dollars and thirty cents in feed cost per 100 pounds of fat produced.

In regard to palatability there seemed little to choose, as the cattle appeared to relish both silages equally well. At times, however, it did appear as though the sunflower silage was relished the more of the two.

From these results it would appear (1) that silage made from either sunflowers or oats, peas and vetches, is very suitable and desirable as a winter feed for dairy cattle; (2) that there is very little to choose between sunflower silage and O.P.V. silage for dairy cows, as the sunflower has a slight advantage for milk production and fat, but in palatability they seem about equal, while in feed cost to produce 100 pounds of fat or milk there is not a really significant difference.

The sunflower silage has a disadvantage, however, in that it seems to freeze more readily in the silo than does the O.P.V.

SUNFLOWER VERSUS O.P.V. SILAGE FOR GROWING CALVES

This experiment was conducted during the same four thirty-day periods as the one with the milking cows, the object being to determine the relative value of the silages as feed for growing calves. Ten calves were selected, five grade Ayrshires and five grade Shorthorns. They were weighed at the beginning and end of each thirty-day period and their hay and grain ration was the same for the first two periods. At the commencement of the third period their hay ration was increased by two pounds each per day and their grain ration by one pound each per day.

This was found necessary as the age and development of the calves during the first sixty days necessitated an increase being made in their hay and grain allowance. The intention was that silage should be fed in equal quantities for each period, but in actual practice we found that on account of the greater percentage of water in the sunflower silage, the calves were unable to handle as large quantities of the O.P.V. as they were of the sunflowers.

The ration per day in detail fed each of the ten calves during the four periods are as follows:—

SUNFLOWER VERSUS O.P.V. SILAGE FOR GROWING CALVES—RATION GIVEN

Periods	Hay	Meal	Silage
	Pounds	Pounds	Pounds
Period 1—Sunflowers	6	4	16
Period 2—O.P.V.	6	4	14
Period 3—Sunflowers	8	5	18
Period 4—O.P.V.	8	5	16

The grain mixture consisted of bran one part, whole oats one part, and oil-cake one part. The results obtained are as follows:—

SUNFLOWERS VERSUS O.P.V. SILAGE FOR GROWING CALVES

Items		Average of Periods 1 and 3	Average of Periods 2 and 4
Experimental Ration		Sun-flowers	O.P.V.
Number of calves in experiment	No	10	10
Total gain of 10 calves in 30 days	lbs.	309·00	395·00
Average daily gain per calf	"	1·03	1·32
Total hay consumed by 10 calves in 30 days	"	2100·00	2100·00
Total meal consumed by 10 calves in 30 days	"	1350·00	1350·00
Total silage consumed by 10 calves in 30 days	"	5100·00	4500·00
Hay consumed per 100 pounds gain	"	679·61	531·64
Meal consumed per 100 pounds gain	"	436·89	341·77
Silage consumed per 100 pounds gain	"	1650·48	1139·24
Findings of Experiment			
Cost of meal mixture	$	23·63	23·63
Value of hay	$	10·50	10·50
Value of silage	$	17·85	15·75
Total cost of feed	$	51·98	49·88
Feed cost to produce 100 pounds gain	$	16·£0	12·62

Deductions

In these results, periods one and three are averaged and compared with periods two and four, and it may be noted that the average daily advantage in body gain per animal equals 0·29 pound, which while not large, is worth consideration. That is, if the farmer had both of these silages available, he would be well advised to use the O.P.V. for growing calves rather than the sunflowers; however, either one makes excellent feed for calves during the winter months.

In feed cost to produce 100 pounds gain, the O.P.V. had an advantage over the sunflowers of four dollars and eighteen cents, which, of course, was partly caused by the fact that a smaller quantity of the O.P.V. silage was consumed.

BEEF CATTLE

While the dairy industry possibly gives more promise of profit in this part of Ontario than beef raising, nevertheless the raising of beef cattle is worthy of some consideration, as the summer pasture is good and an abundance of cheap feed such as clover hay, oat hay, silage, etc., may be produced to carry the cattle over the winter. They require a good deal less attention than the dairy cattle and can, therefore, be looked after in larger numbers with less expense.

The present beef herd consists of ten Shorthorn cows, four three-year-old heifers, six two-year-old heifers and fourteen younger heifers, ranging in age from young calves to over one-year-old. None of these cattle is pure-bred, but they are all well graded up and show the effect of the continuous use of a good pure-bred sire. The herd sire, Jubilee Prince —151283—, is a nice type of bull and is leaving good stock.

While selecting and keeping the best milking cows from the beef herd is kept in mind, yet beef production must not be lost sight of, and accordingly most of the cows raise their own calves and this of course prevents the keeping of yearly records in milk production. There is an abundance of pasture for the beef herd on the stump land area of the station which has always been

seeded out as the fire prepared the ground by burning up the brush, logs, moss, etc.

During the winter months the beef herd is fed some straw and a small amount of grain with their silage. As with the dairy cows the individual rations vary according to the size, constitution and condition of each animal; but an average ration for a cow weighing 1,200 pounds would be as follows: ensilage, fifty pounds; hay, five pounds; straw, five pounds; and grain, ten pounds per day. The ensilage is fed twice daily with the grain spread over it, while the hay and straw are each fed once per day.

SUNFLOWER VERSUS O.P.V. SILAGE FOR WINTERING BEEF CATTLE

This experiment was conducted during the same four thirty-day periods as those with milking cows and growing calves. The object was to determine the comparative value of sunflower versus O.P.V. silage when used as a major portion of the winter ration for beef cows.

For this test ten head of beef cattle were selected on November 1, 1922, consisting of seven two-year-old heifers and three three-year-old heifers. Their ration was identical over the four thirty-day periods with the exception of the variety and quantity of silage fed. In November they got sunflowers; December, O.P.V.; January, sunflowers, and February, O.P.V. As with the dairy cattle, the original intention was to feed the silage in equal quantities during each of the four periods; but it was found in the second period that the cattle were unable to handle quite as great a weight of the O.P.V. silage as they had been of the sunflowers during the first period, so the amount was cut down to what they could consume. In November and January the three three-year-old heifers were fed thirty-five pounds each of silage per day, four pounds each of grain per day and two of them got ten pounds each of hay per day while the other one got five pounds of hay and five pounds of straw per day. During the same two months the seven two-year-olds got thirty pounds each of silage per day and five of them got ten pounds each of hay, while the other two got five pounds each of hay and five pounds each of straw. None of the two-year-olds were fed grain.

During December and February the ration was the same as above, only that O.P.V. was fed instead of sunflowers and at five pounds per head less per day.

The results obtained are as follows:—

SUNFLOWERS VERSUS O.P.V. SILAGE FOR BEEF CATTLE

Items		Average Periods 1 and 3	Average Periods 2 and 4
Experimental Ration		Sunflowers	O.P.V.
Number of cows in test	No	10	10
Total gain of 10 cows in 30 days	lbs.	309·5	325·5
Average daily gain per cow	"	1·03	1·08
Total hay and straw consumed by 10 cows in 30 days	"	3000·00	3000·00
Total meal consumed by 10 cows in 30 days	"	360·00	360·00
Total silage consumed by 10 cows in 30 days	"	9450·00	7950·00
Hay and straw consumed per 100 pounds gain	"	969·34	921·65
Meal consumed per 100 pounds gain	"	116·3	110·6
Silage consumed per 100 pounds gain	"	3053·31	2442·30
Findings of Experiment			
Cost of meal mixture	$	6·30	6·30
Value of hay and straw	$	15·00	15·00
Value of silage	$	33·08	27·82
Total cost of feed	$	54·38	49·12
Feed cost to produce 100 pounds gain	$	17·57	15·09

Deductions

Periods one and three are averaged and compared with the average of periods two and four and it is found that the average daily advantage per heifer for O.P.V. in body gain over sunflowers is only 0·05 pound, which is very small.

In feed cost to produce 100 pounds of gain, the O.P.V. has an advantage of two dollars and forty-eight cents, which was largely caused by the difference in weight of silage consumed.

In palatability there seems little to choose; the only outstanding difference that could be noted between the use of these two silages through the three experiments was the extra amount of urine produced by the cattle during the periods when they were being fed on sunflowers. But as there was slight difference in the results in body gain, we may conclude that more water must have been consumed and there was no apparent bad effect from the extra work of the kidneys.

The feeds were charged in all these experiments at the same rates as quoted under milk records on a former page in this report.

From the data to hand on these three tests it may be assumed (1) that either sunflowers or O.P.V. silage is a good feed for dairy catttle, growing calves or beef cows, (2) that there is little difference between the value of these silages and what difference there is, is in favour of sunflowers for milk production and fat content, but in favour of O.P.V. for body gain in growing calves and beef cows.

These three experiments are being repeated another year, and as the results from one year's test are not sufficient proof, no definite conclusions can as yet be drawn.

SHEEP

This is a good section of the country for sheep raising, as there is plenty of pasture and though the winters are fairly long the sheep do not suffer from the cold if they have a reasonably good shelter. There are two features which prevent many settlers from keeping a few sheep. One is the dog menace and the other is the lack of proper fences. As a remedy for the first trouble a corral built of dog-proof wire fencing is about the best procedure and as a remedy for the second, the building of proper sheep fences when they are first being constructed rather than the usual fence high up off the ground, that will not stop sheep.

The present flock of sheep at this Station consists of twenty-six ewes, thirteen ewe lambs and one ram, all registered Shropshires. In 1923, twenty-nine lambs were born, fifteen males and fourteen females. Of these, twenty-four were raised to weaning age—thirteen females and eleven males.

During the winter the ewes are induced to take as much exercise as possible by feeding them grain in troughs at a considerable distance from the sheep barn. While they are out eating the grain, the hay is placed in the feed racks which are inside, and in this way there is little danger of chaff or dirt getting in the wool. The ration during the winter months consists of clover hay, two and one-half pounds each per day, and one-half pound each per day of grain. The grain mixture is whole oats three parts, bran one part, and oilcake five per cent.

After the lambs are weaned in the fall, the ewes are flushed before breeding, on clover pasture, and grain at the rate of one and one-half pounds each per day.

The ewe lambs are used for experimental work and building up the flock, while the male lambs are disposed of to settlers as breeders, either as lambs or one shear rams.

SWINE

In order that Canada may be in a position to compete on the British market with Danish, Irish, and other export bacon, it is essential that the proper type of bacon hog be raised and also that the proper methods of feeding be practised. The work with swine at this Station has been along the line of breeding and comparing methods of feeding a good type of bacon hog.

The present breeding herd consists of twelve brood sows and one stock boar. These are all registered Yorkshires and the boar Agassiz Bonus —80699—is a particularly fine animal and is siring some really excellent stock.

During the year 1923, twelve spring litters and five fall litters were farrowed. In all one hundred and seventy-one pigs were born and one hundred of these were raised to weaning age.

Log and frame sheep barn under construction. Experimental Station, Kapuskasing, Ont.

The results in raising young pigs this year are far below normal as one of the sows failed to get in pig and three others produced hairless litters. Two of the hairless litters were from young sows giving their first pigs and the third one was an older sow that was rather fat. Quite a number of the pigs raised have been sold as breeding stock and the remainder have been used or are at present being used in connection with experimental work, which has been along the lines of comparing different feeds and methods of feeding for best results.

PIG FEEDING EXPERIMENT

The objects of this experiment are to compare the results obtained from the use of the self-feeder versus pail feeding; tankage fed in the grain mixture from a self-feeder versus tankage fed apart from the grain mixture in a separate self-feeder, versus no tankage in the ration versus skim-milk.

For this experiment thirty pure-bred Yorkshire pigs were selected on January 1, 1923, and divided into five lots of about equal weight and general development. Each lot was housed separately in the main hog pen and had a

supply of mineral matter consisting of charcoal, one bushel; air-slaked lime, four pounds; salt, four pounds; bone meal, four pounds; and one and one-half pounds of copperas dissolved in water and poured over the mineral mixture, which was kept before them at all times during the experiment. The grain mixture was the same for all lots and consisted of equal parts of shorts and finely ground oats and one-half part of barley for the first month. For the remaining three months, the oats, shorts and barley were fed in equal parts.

The details of the method used and material given to each lot are as follows: Lot one, shorts, oats and barley fed from self-feeder. Lot two, shorts, oats and barley pail fed. Lot three, shorts, oats and barley plus five per cent tankage mixed in the feed and all fed from self-feeder. Lot four, shorts, oats and barley fed from self-feeder and tankage fed separate from self-feeder. Lot five, shorts, oats and barley fed from self-feeder and milk fed by hand. Besides the above, fresh water to drink was furnished all lots under test.

The skim-milk was charged at fifty cents per one hundred pounds and the other feeds at average market prices as follows:—

Oats	$ 1 75
Barley	2 00
Shorts	1 50
Tankage	3 50

COMPARISON OF SELF-FEEDER VERSUS PAIL FEEDING, TANKAGE FED BY DIFFERENT SYSTEMS VERSUS NO TANKAGE VERSUS SKIM-MILK, YEAR 1922

—		Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
		Self-fed	Pail fed	Self-fed and tankage mixed	Self-fed—tankage separate	Self-fed and skim-milk
Number of pigs in each lot		6	6	6	6	6
Total weight of six pigs on January 1	lbs.	380·0	384·0	383·0	378·0	385·0
Average weight of each pig on January 1	"	63·3	64·0	63·8	63·0	64·1
Final weight of six pigs on May 1	"	553·0	563·0	606·0	653·0	577·0
Average weight of each pig on May 1	"	92·1	93·8	101·0	108·8	96·1
Total gain of each lot in 120 days	"	173·0	179·0	223·0	275·0	192·0
Daily gain of each lot	"	1·44	1·49	1·84	2·29	1·6
Average gain of each pig in 120 days	"	28·8	29·8	37·1	45·8	32·0
Average daily gain of each pig	"	0·24	0·24	0·3	0·38	0·26
Feed consumed						
Shorts	lbs.	526·0	523·0	530·0	529·0	533·0
Oats	"	526·0	523·0	530·0	529·0	533·0
Barley	"	426·0	423·0	430·0	429·0	433·0
Tankage	"	.....	.....	74·5	275·0	.....
Skim-milk	"	.....	.....	.....	.....	1,503·0
Total meal consumed tankage included	"	1,478·0	1,469·0	1,564·5	1,742·0	1,499·0
Average meal consumed per pig	"	246·3	244·8	236·7	290·3	249·8
Average meal consumed per pig per day	"	2·05	2·04	2·17	2·41	2·8
Amount of meal per hundred pounds gain	"	853·3	820·6	701·5	633·4	780·7
Amount of meal per one pound gain	"	8·54	8·2	7·01	6·32	7·8
Cost of feed per lot labour neglected	$	25 61	25 46	28 43	35 40	33 49
Cost to produce one hundred pounds gain labour neglected	$	14 80	14 22	12 74	12 87	17 44

Deductions

In comparing the results between lot one and two, we find that the pail-fed lot gave slightly the larger gains and at the lowest cost per pound when the difference in labour requirement is not considered.

Between lots one and three it may be noted that those on tankage made greater increase and cheaper gains than lot one getting no tankage.

Comparing lots three and four the results show that tankage fed separately will give larger gains than when mixed with the meal, but the cost to produce one hundred pounds gain is slightly higher on account of so much more tankage, which is an expensive feed, being consumed.

Lot five getting the skim-milk made greater gains than either lots one or two which got neither skim-milk nor tankage, but they made smaller gains than either lot three or four which were getting tankage. It may be stated, however, in fairness to the skim-milk that the supply was not sufficient to give it a really accurate test.

It will be noted that the daily gain of all these pigs was small, and this indicates to some extent the difficulty which is sometimes encountered in winter pork production. The pigs, as a whole, on this experiment were not thrifty, and this accounts for the small gains and the high cost of production with all lots.

Some observations were made in an endeavour to determine the influence of the different methods of feeding on type of the finished hog, but the results were more or less conflicting, so that no definite conclusions could be drawn in this regard.

COMPARISON OF CLOVER PASTURE VERSUS NO CLOVER PASTURE AND THE SELF-FEEDER VERSUS PAIL-FEEDING

The objects of this experiment are to compare the results obtained from growing pigs on clover pasture versus inside without any pasture, and also to compare the results obtained from the use of the self-feeder on clover pasture with those pail-fed.

For this experiment twenty-four pure-bred Yorkshire pigs ranging from eight to twelve weeks of age were selected on August 27, 1923, and divided into three groups of eight each.

Lot number one was housed inside in the main hog pen while lots two and three were turned out on clover pasture and each lot was furnished with a portable hog cabin as a shelter.

The ration was the same for each lot and consisted of finely ground oats, two parts; shorts, two parts; and finely ground barley, one part, plus five per cent tankage for the first thirty days, and for the remaining sixty-one days which the experiment covered, the mixture was equal parts of the above three feeds plus five per cent tankage. Besides this ration, each lot received the same amount of skim-milk which varied slightly from day to day.

The numbers one and two lots were fed their grain as a slop mixed in water and milk, while lot three ate their grain dry from the self-feeder and drank their milk from a trough. Fresh water to drink was kept before all three lots at all times.

The experiment was conducted last year as well and the following two tables give the results obtained in 1923 and the average results of 1922-23:—

COMPARISON OF CLOVER PASTURE VERSUS NO CLOVER PASTURE AND SELF-FEEDER VERSUS PAIL FEEDING, 1923

——	Lot 1	Lot 2	Lot 3
	Inside and hand-fed	Clover pasture and hand-fed	Clover pasture and self-fed
Number of pigs in each lot	8	8	8
	Pounds	Pounds	Pounds
Total weight of eight pigs on August 27	330·0	305·0	300·0
Average weight of each pig on August 27	41·25	38·12	37·5
Final weight of eight pigs on November 26	876·0	834·0	823·0
Average weight of each pig	109·5	104·25	102·8
Total gain of each lot in 91 days	546·0	529·0	523·0
Average gain of each pig in 91 days	68·25	66·12	65·37
Average daily gain per pig	0·75	0·72	0·71
Average daily gain per each lot of eight pigs	6·0	5·81	5·74
Feed consumed			
Finely ground oats to each lot	685·0	694·0	721·0
Shorts to each lot	685·0	694·0	721·0
Finely ground barley	585·0	594·0	621·0
Tankage	98·0	99·0	103·0
Milk	877·0	877·0	877·0
Total grain ration per lot	2,053·0	2,081·0	2,165·0
Average grain ration per pig	256·0	260·1	270·6
Average grain ration per pig per day	2·82	2·85	2·97
Amount of meal per 100 pounds gain	376·0	393·38	413·95
Amount of meal per one pound gain	3·76	3·93	4·13
	$ cts.	$ cts.	$ cts.
Cost of feed per lot, labour neglected	41 08	42 29	43 84
Cost to produce 100 lbs. gain labour neglected	7 52	7 99	8 38

COMPARISON OF CLOVER PASTURE VERSUS NO CLOVER PASTURE AND THE SELF-FEEDER VERSUS PAIL FEEDING, AVERAGE RESULTS FOR 1922–1923

——	Lot 1	Lot 2	Lot 3
	Inside, hand-fed	Pasture, hand-fed	Pasture, self-fed
Number of pigs in each lot	18	18	18
	Pounds	Pounds	Pounds
Total weight at commencement	787·0	754·0	750·0
Average weight per pig at commencement	43·7	41·9	41·6
Final weight of each lot	1,698·0	2,249·0	2,298·0
Average weight of each pig	94·3	124·9	127·6
Total gain of each lot in 91 days	911·0	1,495·0	1,548·0
Average gain of each pig in 91 days	50·6	83·0	86·0
Average daily gain per pig	0·55	0·91	0·94
Average daily gain per each lot	10·0	16·4	17·0
Feed consumed			
Finely ground oats per each lot	1,302·7	1,667·6	1,791·8
Shorts and middlings to each lot	1,302·7	1,667·6	1,791·8
Finely ground barley to each lot	1,454·4	2,175·2	2,396·6
Tankage	202·8	274·5	299·5
Milk	2,259·0	2,259·0	2,259·0
Total grain ration per lot	4,262·6	5,784·9	6,278·7
Average grain ration per pig	236·8	321·3	348·8
Average grain ration per pig per day	2·6	3·5	3·8
Amount of feed per 100 pounds gain	467·9	386·2	405·6
Amount of feed per one pound gain	4·6	3·8	4·0
	$ cts.	$ cts.	$ cts.
Cost of feed per lot labour neglected	93 04	125 02	135 03
Cost to produce 100 lbs. gain labour neglected	10 21	8 36	8 72

From these two tables it may be noted that the results are somewhat different from those obtained in 1922. In the latter year, the clover pasture gave much cheaper gains than pen-feeding, while in 1923 the pigs inside gave the largest gains and at the smallest cost per 100 pounds for feed alone.

The self-feeder gave about the same results as last year, namely, no advantage when the cost of labour is not included.

The pigs on pasture in 1923 did not have as good a chance as those on pasture in 1922. Owing to the fact that all of the female pigs from the early litters were disposed of as breeders, we were short of pigs to commence the experiment on time, and even when it was commenced, a number of the pigs were too young and small to give the best results on pasture.

The average of the two experiments as shown in table two, is possibly the safest information for the present until the experiment has been repeated, using a larger and older run of pigs and if possible getting the experiment commenced earlier in the season.

HORSES

No experimental work has been attempted with horses, as those kept to date have been used for work only.

At the present time eleven horses are on the Station. Ten of these are of the draft type, either Clydesdale or Percheron grades, and the other one is a driving horse which is used for drawing express, delivering vegetables, etc.

No trouble has been experienced in locating work the year round for all of the horses kept. In the summer they are needed for the regular farm work and during the winter there is always an abundance of wood, pulp, timber, manure, hay, etc., to haul.

A record is kept of the feed consumed and the hours worked by each horse during the year and while the feed varies slightly with the individuality of the horse and the nature of the work he is employed at, the following might be considered as a representative ration for a horse weighing 1,500 pounds and working steadily at reasonably heavy work: mixed hay eighteen pounds per day; whole oats or oats and bran, fifteen to eighteen pounds per day, depending on the nature and the severity of the work.

The horses are usually given a bran mash or some boiled barley as a conditioner on Saturday nights, and during the winter this is supplemented by a small teaspoonful of saltpetre as a preventive of kidney trouble.

FIELD HUSBANDRY

ROTATION OF CROPS

While a country is new and only a comparatively small area has been brought under cultivation, it would be impossible for the settlers to put into practical operation a regular system of rotation of crops. Nevertheless, as time goes on and the area under cultivation becomes larger, the advisability of establishing such rotations will become more and more apparent. It would be unfortunate indeed to have the fertility of the soil unnecessarily depleted, owing to the practice of wasteful methods in the arrangement and cultivation of farm crops. In order that some reliable data might be gathered for the settler as to the most practical and suitable rotations for this part of Ontario, a comprehensive experiment in crop rotations was commenced at this Station in 1922.

The area covered by each rotation is determined by the number of years which the rotation runs. That is, there is one acre for each year that the rota-

tion covers, giving a three-year rotation three acres, a four-year rotation four acres and so on. The areas are not as large, perhaps, as might be desired, but they are large enough to make possible the keeping of cost of production records, and in this way they are representative of average field conditions.

The rotations are situated on clay-loam soil which is fairly uniform. There are a few muck areas crossing all rotations under test, and therefore should not affect the basis of comparison.

Some of the main points on which it is hoped to get reliable data, and from which certain valuable deductions may be drawn from time to time are as follows:—

1. The value, if any, of a short rotation in building up the fertility of the soil.
2. The effect on the following crop of a sod, one, two and three years old.
3. The yield of hay from first, second and third year meadows.
4. The yield of sunflowers, following clover sod, timothy sod and following grain.
5. The yield of grain after (1) sunflowers, (2) hay, (3) grain.
6. The success of various rotations involving various proportions of the different types of crop.
7. The use of fall or spring grain.
8. The value of a summer-fallow, as compared with a cleaning crop like potatoes or sunflowers.
9. The value of potatoes as a money crop.

In connection with 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 on which to compare the rotations and from these figures may be calculated the profits or losses obtained.

DESCRIPTION OF ROTATIONS

Following is a description of each rotation under test, and the mode of operation employed in carrying it on. In view of the fact that these rotations are only in the process of establishment, it has not been thought advisable to publish any of the results obtained this year as these would not be a reliable criterion by which to judge the comparative value of the different rotations.

ROTATION A (THREE YEARS' DURATION)

First year	Sunflowers.
Second year	Oats.
Third year	Clover hay.

This rotation may be termed a practical short rotation and is often used in an endeavour to build up the fertility of a worn-out soil. It is also very valuable in keeping down weeds which become established in long standing meadows.

The clover sod is given an application of manure at the rate of twelve tons to the acre and fall-ploughed in preparation for the sunflowers, which are the first crop in the rotation. As soon as possible after the sunflower crop has been harvested the land is again ploughed and made ready for the oat crop the following year. The oat crop is seeded as early in the spring as the condition of the land will permit, together with a mixture of grass and clover seed. Clover hay is cut during the third year of the rotation.

One main feature of this rotation is its ability to keep the land clean. The cultivation given the sunflowers destroys any weeds that might be liable to become established in open ground, while the short time which the land is left in hay prevents the establishment of weeds of a perennial nature. There

is generally a good clover aftermath ploughed down in the fall and this should also have a good effect in building up the fertility of the soil. Its only weakness might be the fact that it demands a rather large proportion of the farm in hoed crops and for this reason it could only be applied on a part of a fair-sized farm.

ROTATION B (FOUR YEARS' DURATION)

First year	Sunflowers
Second year	Oats
Third year	Clover hay
Fourth year	Timothy hay

This is a four-year rotation and is operated in practically the same manner as rotation A, with the exception that the manure is applied at the rate of sixteen tons to the acre for sunflowers instead of twelve, and the rotation also covers one more year, the fourth year being a timothy meadow.

This is possibly one of the best and most practical rotations of all those under test. It reduces the area in hoed crop and increases the area in hay, making it more suitable as a mixed farming rotation. A rotation of this nature is used very largely on the Illustration Stations throughout the Dominion.

ROTATION C (FIVE YEARS' DURATION)

First year	Oats
Second year	Sunflowers
Third year	Barley
Fourth year	Clover hay
Fifth year	Timothy hay

This rotation increases the acreage of grain and also gives a variety in the same. The five crops which are represented are all well adapted to northern Ontario and have all given good results in yields and quality. The rotation is one which should furnish a supply of both roughage and concentrates for all the common kinds of live stock kept on the average farm. After haying, the timothy sod is fall-ploughed in preparation for the oat crop, which is the first crop in the rotation. The oat stubble is given an application of manure at the rate of twelve tons to the acre and fall-ploughed for the sunflower crop the following year. The sunflower stubble is ploughed under in the fall and seeded out to clover and timothy the following spring, using barley as a nurse crop. Clover hay is cut the fourth year and after haying the land is given a top dressing of manure at the rate of eight tons to the acre, which is for the benefit of the timothy meadow during the fifth year and the oat crop during the first year.

ROTATION D (SIX YEARS' DURATION)

First year	Potatoes
Second year	Wheat
Third year	Barley
Fourth year	Clover hay
Fifth year	Timothy hay
Sixth year	Timothy hay.

This is the longest rotation of all those under test. The crops included may be used for feeding on the farm or they might all be disposed of in the form of cash crops. There is no arrangement made for the production of silage or oats, which are two of the main crops needed in mixed farming. One-half of the total area is in hay and a three-year-old meadow is utilized, which at best is a doubtful practice.

After haying, the land is given an application of manure at the rate of sixteen tons to the acre and fall-ploughed in preparation for the potato crop. Considerable cultivation is given the potatoes during the growing season, and this puts the soil in excellent condition for the production of spring wheat the

following year. After the potatoes are dug in the fall, the land is ploughed and seeded to wheat the following spring. The barley crop is seeded on wheat land which is fall-ploughed and forms a nurse crop for the grass and clover seed which is sown at the same time. After the barley is harvested, the new seeding is given a top dressing of manure at the rate of eight tons to the acre. This is for the benefit of the hay crops during the next three years.

ROTATION E (FIVE YEARS' DURATION)

First year	Oats seeded to clover
Second year	Summer-fallow
Third year	Fall wheat
Fourth year	Clover hay
Fifth year	Timothy hay.

The first, fourth and fifth years of this rotation are the same as in "C"; while the summer-fallow in the second year has taken the place of sunflowers as a cleaning crop and fall wheat is used to seed out with in the third year instead of barley.

In preparation for the oat crop the first year of the rotation, the timothy sod is fall-ploughed. The clover seed is sown when the oats are seeded in the spring. The second year the clover sod is allowed to grow until it has become a fair height, after which it is given an application of manure at the rate of twelve tons to the acre and ploughed down as a part of the summer-fallowing operation. The land is given frequent cultivation until the latter part of August, when the fall wheat is sown together with some timothy seed. The next spring the clover is sown just as the snow is leaving the ground. Clover hay is cut during the fourth year and after haying the meadow is given a top dressing of manure at the rate of eight tons to the acre, which is for the benefit of the next two crops, namely, timothy hay and oats. It need hardly be expected that this rotation will prove to be a very profitable one, because it is using up manure at the rate of four tons per acre per year and it also demands two seedings during the rotation with only four crops obtained.

The rate of applying manure is constant and equal throughout all of the rotations and is four tons per acre per year. In the first two rotations the total amount is given in one application, while in the other three it is divided into two applications.

COST OF PRODUCING FARM CROPS

Cost of production records are kept of all field crops grown at this station. In arriving at these costs, the actual prices are used wherever possible, such as the cost of labour, twine, seed, etc. The rent of land is arrived at by multiplying the value of the land by the current rate of interest on first mortgages; the use of machinery is charged at three dollars per acre and is arrived at by figuring the interest on investment, depreciation charges and a percentage for repairs under Eastern Canada conditions. The cost of horse labour is taken at twelve cents per hour and is arrived at on the basis of the cost of maintenance for one year divided by the number of hours' work done under Eastern Canada conditions.

The figures which follow are all for areas under actual field conditions and which are not included in the rotations or other experimental work, with the exception of those given for spring and fall wheat. These latter figures are taken from rotation records as there were no other representative areas of these crops this year and it was thought advisable to include them in the calculations.

COST OF PRODUCING OATS

Twenty acres of oats were grown under field conditions, aside from experimental plots, at the station in 1923. The seeding was done from May 14, to the end of May, and germination and growth were quite satisfactory. After June 22 there was an abundance of moisture and the crop came along in good shape, the only difficulty being, that it was decidedly slow in maturing, which threw the work of harvest late and into bad weather for curing the crop. A severe storm on September 13, including a heavy wind and some snow, lodged practically all of the crops that were uncut at that time. The cost of production is as follows:—

Total cost per acre	$23·98
Yield per acre	43·5 bushels
Cost per bushel	$ 0·55

COST OF PRODUCING SPRING WHEAT

As no spring wheat was grown in 1923 under field conditions other than the one acre which is included in the six-year rotation, it has been thought advisable to publish the cost of production on this area in order that some information may be included in the report on the production cost of this crop.

This acre of Marquis wheat was seeded on May 14, at the rate of two bushels per acre and harvested on September 12, making 121 days of a growing period. The land had previously produced a crop of potatoes, for which crop it had received an application of manure at the rate of sixteen tons to the acre. After the potatoes had been dug in the fall, the land was ploughed in preparation for the wheat crop in 1923.

The seed germinated well and good length of straw and head developed. Owing to the abundance of moisture late in the season, the crop was slow in completing growth, but eventually matured, giving a good yield of fair quality grain. The cost of production is as follows:—

Total cost per acre	$29·87
Yield per acre	32 bushels
Cost per bushel	$ 0·93·3

COST OF PRODUCING FALL WHEAT

During the summer of 1922, a ten-acre field, which had been in night pasture, was ploughed and put in readiness for fall wheat. The seed was sown on August 24, at the rate of two bushels per acre; but owing to the extremely dry weather and the heavy clayey nature of the soil, a large percentage of the seed failed to germinate, and consequently a poor stand developed before the freeze-up.

The wheat suffered little, however, from winter or spring killing and received no damage from frost during the summer, so that it developed into about half a crop of fair quality grain. In view of the fact that only about fifty per cent stand was obtained, owing to dry weather and poor germination, cost of production figures on the area would be misleading and would not be representative.

In connection with our rotation work, one acre of fall wheat was sown on a summer-fallow where the land was not so heavy. The summer-fallowing seemed to retain a sufficient supply of moisture to germinate the seed and as a result the plants were a good height before the winter set in. The variety grown was Dawson's Golden Chaff. In preparation for this crop, the new seeding of clover was ploughed under together with an application of manure at the rate of twelve tons to the acre when the clover was eighteen inches to two feet high and disked occasionally from that time until the wheat was sown on

August 25. No winter-killing occurred and the crop developed into a nice stand of good quality grain which was harvested on August 18. The cost of production is as follows:—

Total cost per acre	$32·05
Yield per acre	28 bushels
Cost per bushel	$ 1·14

COST OF PRODUCING BARLEY

The only area of barley grown this year which was not included in rotations or other experimental work was twenty-six acres which was seeded on May 18, at the rate of two bushels per acre on fall-ploughed land which had previously produced a crop of oats, peas and vetches for silage. The field was harvested on August 30, to September 4, and produced a fair yield of good quality grain. The cost of production is as follows:—

Total cost per acre	$23·29
Yield per acre	27·19 bushels
Cost per bushel	$ 0·85

COST OF PRODUCING HAY

The 1923 hay crop was not nearly so heavy as the other farm crops, comparatively speaking. This was largely caused by the decidedly dry season of 1922, which resulted in poor catch of new seeding in practically every case. The spring of 1923 was also dry until June 22, and as hay is a crop which grows early in the season, the rain at this time was a little late for best results. However, the moisture assisted materially in thickening up the meadows and resulted in a fairly good yield of good quality hay. The weather during the middle of July was ideal for haying operations, as there was only 0·09 of an inch of rain from July 6 to 22 inclusive, and this was the period during which most of our hay was cured. The standard hay mixture which has been used in the past is red slover eight pounds, timothy eight pounds and alsike clover two pounds per acre. As two years is the normal age of meadows, only one-half of the cost of grass and clover seed is charged to each crop. The new meadows are mostly clover, but the percentage of timothy is increased by the second year. During the wet seasons, the clover grows the better of the two and more or less crowds out the timothy even on two-year-old meadows.

One hundred and twenty-six acres of hay were grown under field conditions and exclusive of experimental work in 1923. The cost of production is as follows:—

Total cost per acre	$14·55
Yield per acre	1 ton 420 lbs.
Cost per ton	12·02
Total value per acre 1 ton 420 lb. at $22 per ton	26·62
Profit per acre	12·07

COST OF PRODUCING SUNFLOWERS

The cost of producing sunflowers will be dealt with under the drainage experiment as practically no other sunflowers were grown this year except in the rotations.

COST OF PRODUCING O.P.V. ON NEW LAND

The area from which this data has been secured is a sixteen-acre block of new land which was cleared in 1922, ploughed and after-disked during the autumn. In the spring of 1923, it was again disked and seeded on May 31, at the rate of two bushels of O.A.C. No. 72 oats, one bushel of Golden Vine peas and one-half bushel of common vetch to the acre. Germination was rapid and crop

came along in excellent shape, particularly after the heavy rains during the latter part of June. The crop was harvested on September 5 and 6 and gave a good yield of excellent silage material. The cost of production is as follows:

Total cost per acre	$37·17
Yield per acre	7 tons 1,200 lbs.
Cost per ton	4·94
Value per acre, 7 tons 1,200 lbs. at $6.60 per ton	50·34
Profit per acre	13·17

COST OF PRODUCING POTATOES

Five acres of potatoes were grown under regular field crop conditions in 1923. They were planted in clover sod which had been fall-ploughed and afterwards given an application of manure at the rate of sixteen tons to the acre, well disked in.

The rows were about three feet apart and the sets were placed twelve inches apart in the row. The variety grown was Green Mountain, and the sets were ploughed in during the week of May 21. They grew well and gave a large yield of good quality tubers. They were harvested with a potato digger on October 10, 11, and 12. The cost of production is as follows:—

Total cost per acre	$83·31
Yield per acre	203·8 bushels
Cost per bushel	$0·41

CULTURAL EXPERIMENTS

With the object of collecting some reliable data on a number of cultural problems relative to the treatment of new soil, the value of drainage, the effects of different width of lands on surface drainage, the best rates and dates of seeding sunflowers and O.P.V. the best methods of applying manure, green manure experiments, land cleaning experiments, etc., a large number of cultural experiments have been established at this Station. Some of these experiments are in the form of definite rotations and as these are not yet entirely established, no figures will be available for publication this year. There are a number, however, which have been in operation for two and three years and these are reported on up to date.

RATE OF SEEDING SUNFLOWERS

As sunflowers are becoming an important crop in this part of Ontario for the production of silage, it is advisable that some data should be available in regard to the rate of seeding which will give the largest yield and be the most satisfactory generally. With the object of getting some data on this, an experiment was commenced in 1921. In 1923, twelve different rates of seeding were tried in triplicate one-fortieth acre plots. The seed was sown on May 19, on clay-loam soil which had previously produced a crop of mangels. The land was fall-ploughed and in the spring an application of twelve tons of manure to the acre was disked in before seeding.

In 1923, besides taking the green weight from each plot, a large representative sample was run through a cutting box, from which was taken a two-pound sample of the cut material for the purpose of determining the dry matter content. This two-pound sample was dried to constant weight in a drying house and weighed again before being sent to Ottawa for bringing to a moisture free basis.

This year, one column in the table will show the yield of dried material based on the constant weight of the two-pound sample as determined in the

drying house. The following table gives the different rates of seeding and the results obtained in 1923, together with the average for three years:—

RATES OF SEEDING SUNFLOWERS

No. of plot	Distance between rows	Distance between plants in rows	Average height in 1923	Green weight per acre 1923	Dry weight per acre 1923	Average yield green material per acre 1920-1923
	Inches	Inches	Ft. Ins.	Tons lbs.	Tons lbs.	Tons lbs.
1	24	6	6 . 2	15 800	2 731	16 600·0
2	24	12	6 4	13 1,440	2 464	14 980·0
3	24	18	6 5	13 160	2 93	15 920·0
4	30	6	6 6	16 1,280	2 496	14 1,560·0
5	30	12	6 6	12 1,880	1 1,955	9 1,493·3
6	30	18	6 0	10 1,880	1 1,147	11 593·3
7	36	6	6 8	22 280	3 50	11 132·6
8	36	12	6 8	18 1,120	2 1,468	12 473·3
9	36	18	6 6	15 1,240	2 658	12 413·3
10	42	6	6 0	19 1,240	2 1,384	12 946·6
11	42	12	6 0	13 1,520	1 1,851	12 1,606·6
12	42	18	6 0	16 120	2 693	11 1,040·0

Last year the results of this experiment were such as to indicate that the distance between the rows had a considerable bearing on the yield, while the distance between the plants in the row did not seem to affect it. In 1923, however, the results are such that no important deductions can be drawn, not even from the three year average, unless it might be that the rate of planting should be decided more on the basis of what is most convenient for seeding, cultivation and harvesting, rather than on any difference in yield which might result. Considering these facts, thirty inches between the rows seems to be as suitable a distance as any, because this distance fits in well with a sixteen disc drill, is a fair width for cultivation, and in harvesting with the corn binder the wheel travels directly over the sunflower stubble which is an advantage, in that if the ground is soft, the stubble assists in supporting the binder and the wheel also breaks the stubble down in such a manner that it ploughs under much better afterwards.

In order that a direct comparison may readily be made between the different rates of planting the following two tables have been included. Table number one gives the average yield of sunflowers in 1923 and also the average yield for three years from all plots having different distances between the rows, while table number two gives the average yield of sunflowers in 1923 and also the average yield for three years from all plots having the plants different distances apart in the row.

RATES OF SEEDING SUNFLOWERS, ROWS DIFFERENT DISTANCES APART

Distance between rows	Yield per acre in 1923 from rows different distances apart	Average yield for three years from rows different distances apart
	tons lbs.	tons lbs.
Rows 24 inches apart	14 133·3	15 833·3
Rows 30 inches apart	13 1,013·3	11 1,882·2
Rows 36 inches apart	18 1,546·6	12 73·0
Rows 42 inches apart	16 960·0	12 530·6

RATES OF SEEDING SUNFLOWERS, PLANTS DIFFERENT DISTANCES APART

Distance between plants	Yield per acre in 1923 from plants different distances apart		Average yield for three years from plants different distances apart	
	tons	lbs.	tons	lbs.
Plants 6 inches apart in the rows	18	900	13	1,609·8
Plants 12 inches apart in the rows	14	1,490	12	633·3
Plants 18 inches apart in the rows	13	1,850	12	1,241·6

RATES OF SEEDING ENSILAGE CROPS

With the object of comparing the yields of ensilage crops from various rates of seeding, an experiment was commenced in 1921, using sunflowers, corn and a mixture of oats, peas and vetches. In 1923, the experiment was strengthened by the inclusion of eight more plots representing two additional mixtures of O.P.V., and six additional mixtures where clover were included. It was thought that a few pounds of clover added to the mixture might increase the yield and improve the quality of the silage. It would also make a good clover sod to plough down, a desirable green manure; but of course the seed is expensive and this must also be considered.

In 1923, the seed was all sown on May 30, in triplicate one-fortieth acre plots, two sets namely, "A" and "B" were sown on clover sod which had been spring-ploughed after it had been manured at the rate of sixteen tons to the acre; the "C" set was seeded on fall-ploughed clover sod, manured on top at the same rate and disked in. The sunflowers and corn were sown in drills 24, 30, 36, and 42 inches apart and the plants were thinned to six inches apart in the row, while the oats, peas and vetches were sown as follows:—

Oats 1 bushel, peas 1 bushel per acre.
Oats 1½ bushels, peas 1 bushel per acre.
Oats 2 bushels, peas 1 bushel per acre.
Oats 1 bushel, peas 1 bushel, vetches ½ bushel per acre.
Oats 1½ bushels, peas 1 bushel, vetches ½ bushel per acre.
Oats 2 bushels, peas 1 bushel, vetches ½ bushel per acre.
Also these six with the addition of eight pounds of red clover and two pounds of alsike.

The corn plots were harvested on September 10, the sunflowers on September 11, and the O.P.V. on September 15. The plots were all a little late in being seeded this year, but the yield was fairly good in most cases.

The corn and sunflowers were touched with frost on the night of September 9, which was the first hard frost of the season.

The largest yields obtained in 1923 together with the average results for the three years from sunflowers, corn and O.P.V. are as follows:—

RATES OF SEEDING ENSILAGE CROPS

Crops	Rate of seeding	Average height of crop 1923	Green weight per acre 1923	Dry weight per acre 1923	Average green weight per acre 1921–1923
	inches	Ft. ins.	tons lbs.	tons Lbs.	tons lbs.
Sunflowers	24	6 2	15 200	2 32	15 433·3
Corn	30	4 0	8 1,400	1 187	3 1,160·0
	Bush. lbs.				
Oats	1 00				
Peas	1 00	4 3	10 1,840	2 1,914	6 1,808·0
Oats	1 00				
Peas	1 00	4 0	10 440	2 1,331	7 113·3
Vetch	0½ 00				
Oats	1½ 00				
Peas	1 00	4 0	10 1,680	3 556	6 1,828·0
Vetch	0½ 00				
Oats	2 00				
Peas	1 00	3 11	10 1,880	3 73	0
Vetch	0½ 00				

From results obtained with sunflowers and corn it would appear advisable to be guided more by the various operations connected therewith, such as seeding, cultivation and harvesting, rather than any marked gain which might be expected from any one rate over the other.

Remarkably high yields obtained of both green and dry material from all O.P.V. mixtures sown, indicate rather vividly that O.P.V. has a promising future as a silage crop in northern Ontario, as it has given even greater yields of dry matter than the sunflowers.

DATES OF SEEDING ENSILAGE CROPS

With the object of determining the best date or dates on which to seed the different ensilage crops, an experiment was commenced in 1921. Sunflowers, corn and a mixture of oats, peas and vetches were used in this test. In 1923, the seed was sown on different dates at intervals of seven days commencing on May 9, with sunflowers and O.P.V., but not until May 30 with corn. This experiment was planted this year in triplicate one-fortieth acre plots on clover sod which had been given an application of manure at the rate of sixteen tons to the acre and fall-ploughed. The sunflowers and corn were sown in drills thirty inches apart and the plants were thinned to six inches apart in the rows, while the oats, peas and vetches were sown at the rate of two bushels of oats, one bushel of peas and one-half bushel of vetch per acre. The results obtained in 1923 together with the average green weight per acre for the last three years are as follows:—

DATES OF SEEDING ENSILAGE CROPS

Crop	Date of seeding	Date of cutting	Average height of crop		Green weight per acre in 1923		Dry weight per acre in 1923		Average green weight per acre 1921–1923	
			ft.	ins.	tons	lbs.	tons	lbs.	tons	lbs.
Sunflowers	May 9	Sept. 11	7	10	17	1,520	3	1,489	12	1,540·0
Sunflowers	May 16	Sept. 11	7	4	12	880	3	9	10	1,606·0
Sunflowers	May 23	Sept. 11	7	0	15	520	2	1,048	11	1,340·0
Sunflowers	May 30	Sept. 11	6	4	11	1,360	1	1,546	10	1,686·3
Sunflowers	June 6	Sept. 11	6	2	12	1,960	2	172		
Sunflowers	June 13	Sept. 11	6	0	12	1,240	1	1,808		
O.P.V.	May 9	Aug. 17	3	1	10	1,640	3	1,492	5	1,060·0
O.P.V.	May 16	Aug. 17	3	3	10	1,320	3	1,099	7	540·0
O.P.V.	May 23	Aug. 27	3	4	10	—	3	352	5	326·0
O.P.V.	May 30	Sept. 17	3	4	7	1,280	2	242	5	1,753·0
O.P.V.	June 6	Sept. 17	3	4	8	1,800	2	443		
O.P.V.	June 13	Sept. 17	3	4	9	1,640	2	1,073		
Corn	May 30	Sept. 11	4	4	8	520	0	1,815	4	320·0
Corn	June 6	Sept. 11	3	2	4	960	0	1,059	3	886·0
Corn	June 13	Sept. 11	3	6	7	440	0	1,832	4	893·0
Corn	June 20	Sept. 11	3	0	4	1,600	0	1,345		

It may be explained, that in making up the average yields for the past three years, the first date of seeding did not always come on the same date each year; but the first date of seeding in each year is used in making up the first average and so on with the second, third, and fourth seedings in each year.

The above table indicates that there is a long period during which the various ensilage crops, especially sunflowers and O.P.V., may be sown with a fair chance of obtaining good yields, and it also indicates that the early-sown crops have been giving just as good results as those sown later, in both green and dry material.

In view of these facts we would be inclined to recommend that the sunflower and O.P.V. be sown just as early in the spring as time and weather conditions will permit, as early sowing means that the crops will mature earlier and hence may be ensilaged before the autumn bad weather sets in. On the other hand, on the strength of these results if a farmer found it impossible to get his silage crops seeded early he would be justified in seeding them even as late as the middle of June, because it is then quite possible to get reasonably good yields of fair quality silage.

ENSILAGE AND ROOT EXPERIMENT

The objects of this experiment are to compare the yields of sunflowers, corn and a mixture of oats, peas and vetches for ensilage with a root crop of turnips and also to compare the effect of each of these crops on the following crop. This experiment covers four acres of land and is operated on a four-year rotation as follows:—

First year.....One-quarter acre roots.
One-quarter acre sunflowers.
One-quarter acre corn.
One-quarter acre O.P.V.
Second year.....Oats.
Third year.....Clover hay.
Fourth year.....Timothy hay.

The timothy sod is manured at the rate of sixteen tons to the acre and fall-ploughed in preparation for the ensilage and root crops, which are grown the first year of the rotation. After the ensilage and root crops are harvested, the land is again fall-ploughed and seeded out to grass and clover the next spring, using oats as a nurse crop. Clover hay is cut the third year, and timothy hay the fourth year.

In 1923, acre number four was in ensilage and roots, while acre number one was in oats, following the ensilage and roots in 1922. The following two tables show the results obtained in 1923 from the two acres:—

ENSILAGE AND ROOT EXPERIMENT 1923

Crops	Green weight per acre 1923		Dry weight per acre 1923	
	Tons.	Lbs.	Tons.	Lbs.
O. P. V.	5	280	1	1,232
Turnips	4	620	0	1,224
Corn	4	000	0	1,176
Sunflowers	18	000	2	1,691

YIELD OF OATS FOLLOWING VARIOUS ENSILAGE AND ROOT CROPS

Previous Crop	Yield of Oats per acre 1923		Yield of Straw per acre 1923	
	Bush.	Lbs.	Tons.	Lbs.
O. P. V.	45	6	2	48
Turnips	60	8	2	1,152
Corn	66	20	2	1,888
Sunflowers	42	32	1	1,312

In this particular experiment, it may be noted that the sunflowers out-yielded the O.P.V. considerably in both green and dry material in 1923, and it is also worthy of note, that the corn gave a fairly good yield of green material which had a high water content and hence only a comparatively small dry weight.

The acre in oats yielded as any one might expect who saw the previous crops growing in 1922: that is, it must be remembered that this acre got an application of manure at the rate of sixteen tons to the acre and as the corn crop in 1922 was an entire failure, owing to June frosts little or none of the plant food was used up and consequently was readily available to the oat crop in 1923. In like manner, the turnip crop was light in 1922 and therefore an abundant supply of plant food was left in the soil for the following crop.

While the O.P.V. out-yielded the sunflowers in 1922, this was apparently more the result of poor sunflower germination than from any other cause. Comparing the yield of oats in 1923 following O.P.V. with sunflowers in 1922, we find that the former out-yielded the latter, indicating that possibly the sunflowers are a little harder on the soil than the O.P.V., although too much emphasis must not be placed on one year's results. This experiment will be continued for a number of years until from the data obtained some definite deductions may be made.

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 five acres of clay loam virgin soil, which

had never received any manure, and is to be operated on a five-year rotation as follows:—

First year	Oats seeded to sweet clover
Second year	Sweet clover ploughed down and summer-fallowed.
Third year	Barley seeded to timothy and clover.
Fourth year	Clover hay
Fifth year	Timothy hay

In preparation for the oat crop which is the first crop in the rotation, the timothy sod is fall-ploughed and the sweet clover is seeded at the same time as the grain the next spring.

During the second year, the sweet clover grows until it is a fair stand before it is ploughed under. During the remainder of the season the land is cultivated occasionally, in order to keep down weeds, conserve moisture and assist in the decaying of the sweet clover, which has been ploughed under. This puts the soil in excellent condition for the growing of barley the next year, which is the nurse crop for the timothy and clover. Clover hay is cut the fourth year and timothy hay the fifth.

Ploughing Down Sweet Clover and Buckwheat

The objects of this experiment are 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 is also ploughed under and one-half acre harvested for grain. This experiment was commenced in 1922, and is located on five acres of clay loam virgin soil and the rotation covers five years as follows:—

First year	Oats seeded to sweet clover
Second year	Sweet clover ploughed down, buckwheat planted and one-half of that ploughed down, while the other half is cut for grain, if this is possible
Third year	Barley seeded to timothy and clover
Fourth year	Clover hay
Fifth year	Timothy hay

The timothy sod is fall-ploughed in preparation for the oat crop the first year. The second year the sweet clover is ploughed under in time to permit the getting of the land in readiness for the buckwheat. After the buckwheat is harvested from the one-half of the plot, the whole acre is again fall-ploughed and put in shape for seeding to grass and clover the next year, using barley as a nurse crop. Clover and timothy hay are produced the fourth and fifth years respectively.

It will be noted that these two experiments are very similar and are planned for direct comparison. In the first experiment the sweet clover is simply ploughed under and the land summer-fallowed for the rest of the season, while in the second, an attempt is made to produce a grain crop of buckwheat on one-half of the plot and to plough under a second green crop composed of buckwheat on the other half. These two experiments enable us to make a direct comparison of the effect on the following crops of sweet clover alone ploughed down, sweet clover and buckwheat ploughed down, and sweet clover alone ploughed down and buckwheat harvested.

No Green Manure Crop Ploughed Down

This experiment forms a basis of comparison with the former two rotations, in that no green manure crop is ploughed down; but the growing of a legume grain is used for the building up of the soil. It was commenced in 1922, on four acres of virgin clay loam soil on a four-year rotation as follows:—

First year	Peas
Second year	Oats
Third year	Clover hay
Fourth year	Timothy hay

The timothy sod is fall-ploughed in preparation for the peas. After the pea crop is harvested the land is again fall-ploughed in preparation for the seeding of grain and clover the next spring, using oats as a nurse crop. The third year clover hay is cut, and timothy hay the fourth.

Effect of Growing Non-Legumes, Legumes, and of Ploughing Under Green Manure

This experiment gives a basis of comparison between oats and barley in the rotation versus peas and oats, and it may also be compared with those having green manure ploughed down. This experiment occupies four acres of clay loam soil immediately north of the above experiment and is operated on a four-year rotation as follows:—

First year	Oats
Second year	Barley
Third year	Clover hay
Fourth year	Timothy hay

In preparation for the oat crop, the timothy sod is fall-ploughed. After harvest, the land is again fall-ploughed in preparation for the barley the second year. Barley forms a nurse crop for the grass and clover seed. Clover hay and timothy hay are cut the third and fourth years of the rotation respectively.

FARM MANURE EXPERIMENT

The object of this experiment is to compare the effect of an application of manure at the rate of sixteen tons to the acre once in the rotation, with green manure ploughed down, and with no manure applied of any kind. The area occupied by this experiment is four acres and is operated on a four-year rotation as follows:—

First year	Oats
Second year	Barley
Third year	Clover hay
Fourth year	Timothy hay

The land is fall-ploughed and afterwards manured at the rate of sixteen tons to the acre in preparation for the oat crop the first year. After harvest it is again fall-ploughed and seeded out to grass and clover the following spring, using barley as a nurse crop. The third and fourth years of the rotation clover hay and timothy hay are cut respectively.

LIME EXPERIMENT

The object of this experiment is to determine the results obtained from the application of two tons of ground limestone to the acre during the second year of the rotation. This experiment occupies four acres of land and is operated on a four-year rotation as follows:—

First year	Oats (disc in 16 tons of manure per acre)
Second year	Barley (applying 2 tons of ground limestone)
Third year	Clover hay
Fourth year	Timothy hay

This rotation is practically the same as the one in the farm manure experiment and also in the experiment where no green manure crop is ploughed down, with the exception that an application of two tons of ground limestone to the acre is applied in the second year. The mode of operation is the same as the others. The ground limestone is applied after the land is ploughed for barley, either in the fall or spring.

DRAINAGE EXPERIMENT

The question of underdrainage has always been a much discussed one in this part of Ontario. With the object of comparing the results obtained from tile-drained land with land which is not tile drained, an experiment was established at this Station using twenty acres of uniform clay loam soil, having some shallow muck areas in each half. Ten acres of this area were underdrained by four drains, and the other ten acres were left undrained and the whole area is cropped similarly under a four-year rotation as follows:—

First year	Hoed crops or O.P.V.
Second year	Oats or barley
Third year	Clover hay
Fourth year	Timothy hay

In preparation for the first year's crop, five acres of each ten acres are manured at the rate of sixteen tons to the acre after haying, and the whole twenty acres are fall-ploughed. During the fall and winter, the other five acres in each area are given an application of manure at the rate of sixteen tons to the acre and disked in the spring. After the hoed crop and O.P.V. are removed the land is again fall-ploughed and seeded out to grass and clover in the spring, using oats or barley as a nurse crop. The third and fourth years, clover hay and timothy hay are cut respectively.

In 1923, five acres of sunflowers and five acres of O.P.V. were produced on each ten acres and the cost of production of each of the two crops on the drained and undrained areas is as follows:—

Sunflowers on Drained Land

Total cost per acre	$ 60 31
Yield per acre	13 tons 441 Lbs.
Cost per ton	4 65
Value per acre, 13 tons 441 lbs. at $7.33	96 91
Profit per acre	36 60

Sunflowers on Undrained Land

Total cost per acre	$ 48 69
Yield per acre	7 tons 561 lbs.
Cost per ton	6 68
Value per acre, 7 tons 561 lbs. at $7.33	53 36
Profit per acre	4 67

O.P.V. on Drained Land

Total cost per acre	$ 52 46
Yield per acre	8 tons 819 lbs.
Cost per ton	6 24
Value per acre, 8 tons 819 lbs. at $7.33	61 64
Profit per acre	9 18

O.P.V. on Undrained Land

Total cost per acre	46 28
Yield per acre	5 tons 1,738 lbs.
Cost per ton	7 88
Value per acre, 5 tons 1,738 lbs. at $7.33	43 02
Profit per acre	3 26

SURFACE DRAINAGE EXPERIMENT

The question of what is the proper width of lands to use in ploughing is one on which opinions differ widely. In order to get some data on this subject, an experiment was established at this Station in 1922, when lands of four different widths were placed under test 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

The whole area is put under a four-year rotation as follows:—

First year.....Oats
Second year.....Barley
Third year.....Clover hay
Fourth year.....Timothy hay

The following table gives the yields of both grain and straw obtained from the different widths in 1923:—

SURFACE DRAINAGE EXPERIMENT

Width of Lands	Yield per acre of grain in 1923		Yield per acre of straw in 1923	
	Bush.	Lbs.	Tons.	Lbs.
Lands 18 feet in width	22	28	1	1,038
Lands 24 feet in width	23	24	1	419
Lands 36 feet in width	23	6	1	874
Lands 48 feet in width	35	17	1	952

LAND CLEARING ON THE FARM

The first part of the season was exceptionally opportune for the clearing of land, as the weather was decidedly dry and the stumps were ready to burn as soon as piled. Advantage was taken of this, as ninety acres were cleared of stumps and made ready for the plough this year. Forty acres were cleared on lot 25, concession 12, at a cost of $30 per acre. This completes the clearing on this lot with the exception of a small corner near the river, which has grown up to second growth and is being left for a shelter for cattle, since part of this field is to be fenced off as a night pasture. The other fifty acres were cleared on lot 26, concession 13, at a cost of $30 per acre. Practically all the land that was cleared was later ploughed and put in readiness for crop next year. This brings the total area of land under cultivation up to five hundred acres, which makes an excellent layout for experimental and general farm work.

HORTICULTURE

The horticultural crops did fairly well. Dry weather from early spring until June 22 checked the growth somewhat, but no frost occurred to damage anything until September 10, when most of the vegetables had matured. The first planting was done on May 17, one day earlier than in 1922, but on account of a cold, backward period around May 10, the soil was not in readiness for vegetable seed until the middle of the month.

ORCHARD

In the southwest corner of the horticultural grounds, some 203 specimens, representing forty-eight different varieties and strains of the more hardy apples,

plums and crabs, were set out in 1918. The trees were placed twenty feet apart each way. Of the original 203 trees set, 107 are still alive a few of which bore fruit in 1923. The ninety-six trees which have died from winter killing and other causes have nearly all been replaced and some extension has also been planted, so that at present, there are 179 trees in the orchard which are still alive.

It is the intention to establish a laurel-leaved willow hedge around the horticultural grounds and it is believed that this will have a marked bearing on the success of the fruit trees.

SMALL FRUITS

RED CURRANTS.—Seven varieties of red currants have been under test since the spring of 1920. They were set out in rows six feet apart with five feet between the bushes in the row. They have been bearing for the last two years, the average yield from six bushes in 1923 being 1 pound 14.3 ounces.

Like last year, none of the varieties yielded heavily, but each produced some mature fruit.

WHITE CURRANTS.—Two varieties of white currants were set out in rows six feet apart and five feet between the bushes in 1920. No fruit was produced by these until this year when the results from six bushes were as follows:—

White Grape.....1 pound 8 ounces
White Cherry.....1 pound

BLACK CURRANTS.—Fourteen varieties of black currants have been planted since 1920. They were set out the same way and the same distance apart as the red currants and 1922 was the first year that any fruit was gathered. The average yield obtained from six bushes in 1923 was 2 pounds 9.9 ounces.

GOOSEBERRIES.—Fifteen varieties of gooseberries were set out in 1920. The rows were six feet apart and the bushes were placed five feet apart in the row. The first fruit was obtained from these in 1922, when only a few of the most developed bushes bore any fruit. The average yield from six bushes of the five best varieties was 1 pound 3.2 ounces. The yields were light but the quality of the fruit was good.

RASPBERRIES.—Eight varieties of raspberries were set out in 1920, in rows six feet apart and the canes three feet apart in the row. These have been yielding fairly well for the last three years. The average yield obtained in 1923 from six bushes was 9 pounds 8.8 ounces.

All these varieties seem very hardy and have come through the winters in good condition without any protection. The Newman 23 variety stands first in the list this year and in a three-year average. It is medium in size, firm, and of good quality.

STRAWBERRIES.—No variety test of strawberries was established until this spring, when a number of varieties from different sources were set out. There has been, however, a small plantation, one quarter acre in size, of unnamed and mixed sorts which was set out in 1920 and 1921. This yielded at the rate of 2,400 one-quart baskets to the acre.

VEGETABLES

BEANS.—Twenty-one varieties of garden beans were under test in 1923. The seed was sown on June 1, in rows thirty feet in length, two and one-half feet apart and the plants two inches apart in the row. The average yield

obtained from a thirty-foot row in 1923 was 16.61 quarts. Practically all of the varieties yielded well this year, as there was plenty of moisture during most of the growing season and no damage was suffered from frost.

Round Pod Kidney Wax, Pencil Pod Black Wax, Early Red Valentine, Davis White Wax and Masterpiece are the five best yielding varieties in a four-year average.

BROAD BEANS.—Twenty-one varieties of broad beans were under test at this Station in 1923. The seed was planted on May 19, in thirty-foot rows which were three feet apart, the plants being three inches apart in the row. All varieties germinated well and good yields were harvested. The average yield was 25.7 quarts from a thirty-foot row. The broad bean is one of the hardiest of vegetables and should be grown in every garden of northern Ontario.

BEETS.—Ten varieties of table beets were under test at this Station in 1923. They were seeded on May 18, in drills thirty feet in length and eighteen inches apart and the plants were thinned to two inches apart in the row. The average yield in 1923 from a thirty-foot row was 20 pounds 8 ounces.

The beets were all of fairly good quality this year, and the Detroit Dark Red as usual was one of the best. The main feature of table beets is not so much yield, although this is important, as it is one of quality. A common mistake is made by thinning the beets too far apart in the row, so that they get a chance to become over large, off type, woody and coarse.

CARROTS.—Nine varieties of table carrots were under test this year. The seed was sown in drills thirty feet in length and eighteen inches apart on May 18, and the plants were thinned to one and one-half inches apart in the row. The average yield from a thirty-foot row in 1923 was 23 pounds 14.6 ounces.

The Chantenay and Danvers are among the best varieties of table carrots that have been tried so far. They are both of good quality and give uniform large yields.

CABBAGE.—Twelve varieties of cabbage were under test. The seed was sown in the hotbed on May 2, and the plants were transplanted in the garden on June 21. The plants were set twenty-four inches apart in the rows which were thirty inches apart. The average yield from twelve plots in 1923 was 38 pounds 4 ounces.

The Copenhagen Market which stands at the head of the list this year, is one of the best varieties for the northern climate. In fact, it is being grown with success at James Bay. Cabbage in general is a fairly sure crop, but the plants need to be a good size when they are set out in the garden.

CAULIFLOWER.—Two varieties of cauliflowers were under test in 1923. The seed was sown in the greenhouse on April 21, and the plants were set out in the garden on June 14 in thirty-foot rows with ten inches between the plants. The average yield was 15 pounds 9 ounces from twenty plants.

CELERY.—Seven varieties of celery were tested. The seed was sown in the greenhouse on April 16, and the plants were set out in the garden on July 4. The rows were four feet apart and the plants were set six inches apart in the row. The average yield in 1923 was 83 pounds 11.4 ounces from a fifty-foot row.

Celery is one of the best garden vegetables in northern Ontario and the quality produced is the choicest.

Giant Pascal, Evans Triumph and Winter Queen are among the best varieties tried to date.

CORN.—Seven varieties of sweet corn were under test this year. The seed was planted on June 2, in rows thirty-six inches apart and the hills thirty-six inches apart in the row. Like last year, the germination was slow and the growth was backward, so that no results were obtained from any of the varieties,

with the exception of one, namely Pickaninny. This is a very early sort and yielded three pounds of cobs from the thirty-foot row, which were ready for use on September 20.

CUCUMBERS.—Seven varieties of cucumbers were under test. The seed was sown in the greenhouse on May 1, and the plants were set out in the garden on July 5, in hills six feet apart each way. Some of the plants grew to be a fair size, but no fruit developed on any of the varieties tested. The season as a whole seemed to be a little cool for best results from cucumbers.

ENDIVE.—One variety, Meaux Green Curled, was under test in 1923. The seed was sown on May 17 in a thirty-foot row and the plants were thinned to six inches apart in the row. The yield was 51 pounds.

KOHL RABI.—Two varieties of kohl rabi were under test in 1923. The seed was sown on May 18 in rows which were thirty inches apart and the plants were thinned to eight inches apart in the row. The average yield in 1923 was 15 pounds per thirty-foot row. This vegetable is well adapted to our northern climate and many people like it for table use.

KALE OR BORECOLE.—Only one variety, Dwarf Green Curled, was under test in 1923. The seed was sown in the hotbed on May 2, and the plants were set out in the garden on June 21 in a row thirty feet in length. The plants were twenty-four inches apart in the row. The yield was 21 pounds. This is a hardy vegetable and it does well in this district.

LEEKS.—Two varieties of leeks were under test in 1923. The seed was sown in the hotbed on May 6, and planted out in the garden on June 30 in thirty-foot rows, the plants being set six inches apart in the row. The average yield from a thirty-foot row was 3 pounds 10 ounces.

LETTUCE.—Sixteen varieties of lettuce were under test in 1923. The seed was sown on May 17, in drills fifteen inches apart and the plants were thinned to six inches apart in the row. Most of the varieties came along in good shape, but a number were partly eaten by cutworms. The yields as shown are based on thirty-foot rows complete, that is, if a five-foot space was cleaned out, the variety got credit for the production on this five feet at the average rate of production obtaining on the other twenty-five feet. The average yield from the fifteen best varieties in a thirty-foot row was 79 pounds 10.6 ounces.

The lettuce gave a wonderful yield this year and is a vegetable which should be grown in every garden of this part of Ontario.

MUSK MELONS.—Three varieties of musk melons were under test in 1923. The seed was sown in the greenhouse on May 1, and the plants were set out in the garden on July 1, in hills ten feet apart each way. The plants did not attain a large size and failed to produce any fruit.

ONIONS.—Fourteen varieties of onions were under test in 1923. The seed was sown on May 18, in drills fifteen inches apart, but for some reason the seed failed to germinate and consequently no results were obtained.

DUTCH SETS.—Two varieties of dutch sets were tested in 1923. They were set out on May 19, in rows fifteen inches apart and the sets were placed two inches apart in the row. The average yield from a thirty-foot row was 34 pounds.

It is very interesting to compare the results obtained this year from the onions grown from seed and those grown from sets. In fact, it has been our observation for years, that the onion set is a more certain proposition in this part of Ontario than the seed, although some years a good yield is obtained from the seed.

PARSLEY.—Only one variety of parsley was grown in 1923. The seed was sown in drills fifteen inches apart on May 17, and the plants were thinned to six inches apart in the row. This variety gave a yield of one pound.

PARSNIPS.—Two varieties of parsnips were under test in 1923. The seed was sown on May 19, in rows thirty inches apart and the plants were thinned to two inches apart in the row. The average yield from a thirty-foot row was 23 pounds.

GARDEN PEAS.—Thirteen varieties of garden peas were under test in 1923. The seed was sown on May 19, in rows thirty feet in length, which were three feet apart and the plants one inch apart in the row. The average yield from a thirty-foot row was 9.44 quarts. Garden peas do very well in this section and should be more generally grown in the gardens of the north.

POTATOES.—Three varieties of potatoes were under test in 1923. They were planted on June 5, in one-quarter acre plots in rows thirty inches apart and the tubers being set about twelve inches apart in the row. The average yield per acre in 1923 was 169 bushes 26·6 pounds of marketable potatoes.

The Green Mountain has been giving the largest yields for the past few years. The tubers of all the varieties were a fair size and were also clean and dry. It is the intention to include some additional varieties in the test another year.

PUMPKINS.—Two varieties of pumpkins were under test in 1923. The seed was sown in the greenhouse on May 1, and the plants were set out in the garden on July 7 in hills ten feet apart each way. Only small vines developed and no fruit was produced.

RADISH.—Seven varieties of radish were under test in 1923. The seed was sown on May 17, in drills thirty feet in length and fifteen inches apart. The average yield from a thirty-foot row was 5 pounds 4·5 ounces.

Radish are very easily grown and add materially to the value of a garden. Scarlet Turnip White Tip, and Round Scarlet Oval are two of the best varieties tried this year.

SPINACH.—Five varieties of spinach were under test in 1923. The seed was sown on May 17, in rows which were thirty feet in length and fifteen inches apart. The average yield from a thirty-foot row was 2 pounds 4·8 ounces.

SALSIFY.—Only one variety of salsify was grown in 1923. The seed was sown on May 18 in a thirty-foot row. The plants were thinned to one and one-half inches apart in the row. They were ready for use on October 6, and gave a yield of six pounds of good quality.

SWISS CHARD.—One variety of swiss chard was grown this year. The seed was sown on May 18, in a row thirty feet in length. The plants were thinned to three inches apart in the row. A yield of twenty-eight pounds was obtained, which was of good quality and was ready for use on October 1.

SQUASH.—Seven varieties of squash were under test in 1923. The seed was sown in the greenhouse on May 1, and the plants were set out in the garden on July 5, in hills ten feet apart. The vines remained small and no fruit developed.

SAGE.—The sage which was planted in 1922 wintered in good condition without any artificial protection and gave a larger yield of good quality sage than it did during the first year.

TURNIPS.—Six varieties of turnip were under test in 1923. The seed was sown on May 18 in drills that were fifteen inches apart and thirty feet in length. The plants were thinned to two inches apart in the row. The average yield from a thirty-foot row was 60 pounds 6·6 ounces.

One of the main features in producing a good quality of table turnip is not to have the plants too far apart in the row. If they are given too much room, it allows them to become coarse, large and of poor quality.

Purple Top Milan and Early Snowball are two of the largest yielders this year.

TOMATOES.—Eight varieties of tomatoes were under test this year. The seed was sown in the greenhouse on April 17, and the plants were set out in the garden on June 30. Six plants of each variety were set out in rows four feet apart and the plants were four feet apart in the row. Each plant was tied to a stake with raffia. Only one variety, namely, Burbank, ripened any fruit. It gave twelve ounces of ripe fruit and one pound one ounce of green fruit. All of the varieties, however, gave a small quantity of green fruit as follows:——

VARIETY TEST OF TOMATOES

Variety	Yield of fruit from six plants 1923	
	Lbs.	Ozs.
Sunnybrook Earliana	5	8
Mascot Early	3	4
Alacrity	2	4
Bonny Best	2	0
Burbank	1	13
Pink	1	8
Chalk's Early Jewel	1	4
Prosperity.....No germination	—	—

CULTURAL EXPERIMENTS WITH VEGETABLES

During the season of 1923, a large number of cultural experiments was commenced in connection with the production of vegetables, such as beans, peas, beets, carrots, parsnips, cabbage, celery, corn, tomatoes, potatoes, rhubarb, etc. This is an important feature of the work, because the various methods which have been found to give the best satisfaction at Ottawa or elsewhere may not prove to be the most satisfactory under the soil, climatic and other conditions which prevail in northern Ontario.

RATE OF PLANTING BEANS.—With the object of determining which is the best distance to plant beans in the row, and experiment was commenced in 1923, using two varieties, planted two, four and six inches apart in the row. The seed was planted on June 1, in rows thirty feet in length and thirty inches apart. The results obtained are as follows:—

RATE OF PLANTING BEANS

Variety	Distance apart in the row	Number of days—planting to ready for use	Yield of green pods 1923	Notes on quality
	Inches		Quarts	
Round Pod Kidney Wax	2	71	7·5	Crisp good flavour.
Round Pod Kidney Wax	4	71	6·5	Crisp good flavour.
Round Pod Kidney Wax	6	71	5·0	Crisp good flavour.
Stringless Green Pod	2	71	7·25	Good.
Stringless Green Pod	4	71	5·00	Good.
Stringless Green Pod	6	71	5·5	Good.

RATE OF PLANTING PEAS.—The object of this experiment is to compare the results obtained in earliness, quality and yield from planting peas, one, two and three inches apart in the row. Three varieties were used and the seed was sown on May 19, in rows which were thirty feet in length and thirty inches apart. The results obtained are as follows:—

RATES OF PLANTING PEAS

Variety	Distance apart in the rows	Number of days—planting to ready for use	Yield of green peas 1923	Notes on quality
	Inches		Quarts	
English Wonder	1	67	2·75	Good.
English Wonder	2	67	2·25	Good.
English Wonder	3	67	1·25	Good.
Stratagem	1	76	1·5	Juicy.
Stratagem	2	76	0·5	Juicy.
Stratagem	3	76	0·5	Juicy.
Thomas Laxton	1	76	0·75	Good.
Thomas Laxton	2	76	0·5	Good.
Thomas Laxton	3	76	0·25	Good.

DATES OF SEEDING BEETS.—The object of this experiment is to compare the results obtained in earliness, quality and yield from beets planted at different dates at intervals of ten days, beginning as early as possible and continuing until it is thought to be too late for this experiment. One variety was used and the first date of seeding was on May 17. The seed was planted in rows thirty feet in length, fifteen inches apart and the plants thinned to two inches in the row.

DATES OF SEEDING BEETS

Variety	Date seeded	Date ready for use	Yield from 30 ft. row 1923		Notes on quality
			lbs.	ozs.	
Detroit Dark Red	May 17	Aug. 9	20	8	Good.
Detroit Dark Red	May 27	Aug. 17	21	8	Good.
Detroit Dark Red	June 16	Aug. 26	27	0	Good.
Detroit Dark Red	June 16	Sept. 3	23	0	Good.
Detroit Dark Red	June 26	Oct. 8	22	8	Good.

It will be noted that even the last date of seeding gave good yields. This of course is due to plenty of moisture and freedom from frost during the latter part of the growing season.

DATES OF SEEDING CARROTS.—The object of this experiment is to compare the results obtained in earliness, quality and yields from carrots planted at different dates, at intervals of ten days, commencing as early as possible and continuing until five dates were seeded. For this experiment one variety was used and the first date of seeding was on May 17. The seed was planted in rows thirty feet in length and fifteen inches apart and the plants were thinned to one and one-half inches apart in the row. The results obtained are as follows:—

DATES OF SEEDING CARROTS

Variety	Date sown	Date ready for use	Yield from 30 ft. row 1923	Notes on quality
			Pounds	
Chantenay	May 17	Aug. 20	27	Good.
Chantenay	May 27	Aug. 16	41	Good.
Chantenay	June 6	Aug. 26	17	Good.
Chantenay	June 16	Oct. 6	10	Good.
Chantenay	June 26	Oct. 6	7	Good.

DATES OF SEEDING PARSNIPS.—The object of this experiment is to compare the results obtained in earliness, quality and yields from parsnips planted at different dates, at intervals of ten days commencing as early as possible and continuing until five plantings are under test. For this experiment one variety was used and the first date of planting was on May 17. The rows were thirty feet in length and fifteen inches apart and the plants were thinned to two inches apart in the row. The results obtained are as follows:—

DATES OF SEEDING PARSNIPS

Variety	Date seeded	Date ready for use	Yield from 30 ft. row 1923		Notes on quality
			lbs.	ozs.	
Hollow Crown	May 17	Sept. 28	19	0	Good.
Hollow Crown	May 27	Oct. 1	4	0	Good.
Hollow Crown	June 6	Oct. 8	3	0	Good.
Hollow Crown	June 16	.....	.....		.....
Hollow Crown	June 26	.....	.....		.....

This table would seem to indicate that parsnips should be seeded fairly early.

DATES OF PLANTING POTATOES.—The object of this experiment is to compare the results obtained from potatoes planted at different dates. Two varieties were used and the first date of planting was April 30. They were planted every fourteen days until five plantings were under test.

The rows were sixty-six feet in lenth and the tubers were set one foot apart in the row. The results obtained are as follows:—

DATES OF PLANTING POTATOES

Variety	Date of planting	Yield from 66 ft. row	
		Marketable	Unmarketable
		Pounds	Pounds
Green Mountain	April 30	112·0	8·0
Green Mountain	May 14	71·0	3·0
Green Mountain	May 28	81·5	3·5
Green Mountain	June 11	38·0	2·0
Green Mountain	June 25	53·5	2·5
Irish Cobbler	April 30	32·5	2·5
Irish Cobbler	May 14	44·0	2·0
Irish Cobbler	May 28	30·5	1·5
Irish Cobbler	June 11	23·0	1·0
Irish Cobbler	June 25	100·0	8·0

The results of the above experiment are conflicting, and may have been caused by some variation in the soil or other conditions rather than simply the date of planting. This experiment will be repeated until some conclusive data have been obtained.

GROWING RHUBARB FROM SEED.—The object of this experiment is to determine the length of time required to produce rhubarb ready for cutting when grown from seed. For this experiment five thirty-foot rows were sown with mixed seed of several varieties on May 22, 1923, and this fall the plants were about eight inches high and the size of a lead pencil when the frost came. These will be transplanted into hills two feet apart each way on rich soil and kept clean and well cultivated.

FALL SEEDING OF VEGETABLES

The object of this experiment is to compare the results obtained in earliness and yield from vegetables when the seed is sown just before the ground freezes up in the fall, with those sown in the spring in the regular way. Seven kinds of vegetables were used in this experiment, namely, beets, carrots, cabbage, onions, lettuce, radish and turnips. The seed was sown on November 8, 1923, in thirty-foot rows and these will be compared in 1924 with seed sown in the spring.

FLOWERS

The question of beautifying the home surroundings is by no means unimportant, hence considerable attention has been given to the planting of annual flowers in such a way that a continuation of bloom would be obtained from early summer until late autumn. Considerable success has been met with and the excellent flower borders have received the admiration of all those who visit the Station during the summer season.

In 1923, fifty distinct types or kinds of annual flowers were under test. Many of these were represented by several varieties and colours. Of the fifty sorts under test, twenty-two were sown in the greenhouse on April 20, and set out in the borders on June 27. The seed of the other twenty-eight were sown in the borders direct on June 7. In view of the fact that there was plenty of moisture and no damage from frosts, the borders presented the best appearance this year of any in the history of the Station.

BULBS.—During the fall of 1921, a commencement was made with outdoor bulb culture, when the following were set out in the borders before the freeze-up: hyacinths five varieties, tulips five varieties, narcissus six varieties, crocus two varieties, freesias one variety and galanthus one variety. The results of the bloom in 1922 were reported in last year's report. No artificial protection was given these bulbs during the winter of 1921 and 1922, and yet the majority of them were able to send forth magnificient bloom again in 1923.

During the fall of 1922, the work with bulb culture was continued by setting out the following bulbs: hyacinths three varieties, tulips twelve varieties, narcissus four varieties and crocus three varieties. In connection with the tulips, seven varieties of these came from the Experimental Station, Sidney, B.C., and the other five from Holland. The Sidney bulbs were larger, more vigourous and gave a greater proportion of bloom over a slightly longer period than those received from Holland.

TREES, SHRUBS AND LAWNS

In 1918, a large number of ornamental trees and shrubs were planted in various locations around the grounds. Some in the form of hedges, while others were planted in ornamental clumps and still others in rows like an orchard for the purpose of a shelter and windbreak. It is remarkable the change that can be made in the appearance of a site in a few years by the judicious selection and planting of a number of ornamental trees and shrubs. Practically all of the trees and shrubs planted have withstood the climatic conditions well and are developing into specimens of usefulness and beauty. The laurel-leaved willow and Russian poplar are worthy of special mention for quick growth and windbreaks. For hedge purposes the laurel-leaved willow and caragana are among the best tried. For lawn decoration and ornamental clumps the different species and varieties of lilacs, japanese rose, Missouri or golden currant, Tartarian honeysuckle, viburnum lantana, sorbus aucuparia, Japanese barberry and dwarf caragana are all suitable for this part of Ontario, and present a very attractive appearance.

LAWNS

The large lawn which was seeded in 1922 has improved greatly during the past season, on account of having plenty of moisture. Kentucky blue grass and white dutch clover mixed, ten pounds of the former to two of the latter, make an excellent mixture.

CEREALS

The growing season of 1923 opened early for this part of Ontario, as seeding operations commenced on May 1. This is the earliest date on which seeding has been done at this Station since its establishment. While the seeding was accomplished in good time, a cold backward spell of weather around May 10, retarded germination, and consequently, the length of time between the seeding of the cereals and their date of maturity is unusually long. The season up to June 22, was very dry, followed by heavy rains which tended still further to lengthen the time required to mature the cereal crops. The abundance of moisture during the latter part of the growing season was largely responsible for the excellent yields which were obtained. The barley and oats in particular made a fine stand and yielded very well indeed. The spring wheat was coming along in good shape until struck by rust which materially reduced the yields.

There was practically no damage from frost this season, as buckwheat, which is one of our tenderest of cereals, matured with only slight injury.

The cereal plots were seeded one foot larger on all sides than was required to make them one-fortieth acre each in size. At harvest time a one-foot border was removed from each plot before the latter was cut so that the yields obtained were more representive of actual field conditions.

SPRING WHEAT

During the season of 1923, four varieties of spring wheat were under test. The seed was sown on May 5, in triplicate one-fortieth acre plots at the rate of two bushels per acre on fairly uniform clay soil, which had previously produced a crop of potatoes. The results obtained are as follows:—

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
			Inches		bush. lbs.
Huron, Ottawa 3	Aug. 31	118	41	9·8	32 40
Marquis, Ottawa 15	Aug. 30	117	38	9·8	30 40
Ruby, Ottawa 623	Aug. 27	114	36	9·6	30 40
Prelude, Ottawa 135	Aug. 23	110	32	9·8	24 00

The above four varieties of spring wheat have been grown at this Station continuously for four years and the average results obtained and number of days to mature and actual yield of grain per acre are as follows:—

VARIETY TEST WITH SPRING WHEAT—FOUR-YEAR AVERAGE, 1920-1923

Variety	Average number of days to mature	Average yield of grain per acre
		bush. lbs.
Huron, Ottawa 3	111·5	28 32·5
Marquis, Ottawa 15	111·5	26 57·0
Ruby, Ottawa 623	100·25	18 34·5
Prelude, Ottawa 135	96·5	17 27·5

The Huron and Marquis are both much heavier yielders than the Ruby or Prelude, but they are also considerably later in maturing and for this reason the early varieties may be used to advantage on small areas of new clearing where the later varieties might be damaged by frost.

OATS

Six varieties of oats were under test at this Station in 1923. The seed was sown on May 5, in triplicate one-fortieth-acre plots at the rate of two and one-half bushels per acre on uniform clay loam soil, which had grown a crop of potatoes the year before. The results obtained are as follows:—

VARIETY TEST OF 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
			Inches		bush. lbs.
Victory	Aug. 31	118	43	8·0	94 04
Gold Rain	" 30	117	44	9·0	92 32
Banner, Ottawa 49	Sept. 1	119	49	9·0	91 26
Alaska	Aug. 28	115	38	7·0	72 32
Daubeney	" 28	115	31	9·5	70 20
Liberty Ottawa 480	" 28	115	40	10·0	25 60

The rows were sixty-six feet in length and the tubers were set one foot good length and most of the plots stood up fairly well.

BARLEY

During the season of 1923, four varieties of six-rowed barley and one variety of two-rowed barley were under test at this Station. They were sown on May 7, in triplicate one-fortieth-acre plots at the rate of two bushels per acre on uniform clay loam soil, which had previously produced a crop of potatoes. The results obtained are as follows:—

VARIETY TEST OF 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
Six-rowed			inches		bush. lbs.
O.A.C. No. 21	Aug. 21	106	45	6·0	68 16
Manchurian, Ottawa 50	" 24	109	46	7·0	65 00
Albert, Ottawa 54	" 13	98	37	9·5	40 00
Two-rowed					
Duckbill, Ottawa 57	" 31	116	43	9·0	61 32
Himalayan, Ottawa 59	" 16	101	32	6·0	47 20

Three of these varieties have been grown for a period of four years and the whole five for a period of three years. The following table shows the average results obtained during the four and three year periods.

VARIETY TEST WITH BARLEY—THREE- AND FOUR-YEAR AVERAGES

Variety	Four year averages 1920–1923		Three year averages 1921–1923	
	Number of days maturing	Actual yield of grain per acre	Number of days maturing	Actual yield of grain per acre
		bush. lbs.		bush. lbs.
Manchurian Ottawa 50	.....	.....	102	40 8·3
Duckbill Ottawa 57	108·5	37 7·2	108	39 10·0
O.A.C. No. 21	103·0	34 8·75	100·6	37 43·6
Himalayan Ottawa 59	.....	.....	98·0	27 43·3
Albert Ottawa 54	94·75	24 43·5	93·6	27 7·3

Barley is a grain crop which can be strongly recommended to the farmers of northern Ontario. It is one of the surest and safest crops for this part of Ontario, giving a reasonably good yield of good quality grain which may be used to advantage, if carefully fed, in the rations of nearly all kinds of live stock, especially cattle, swine and poultry.

FIELD PEAS

Four varieties of peas were under test at this Station in 1923. They were planted on clover sod which was manured and spring-ploughed. The seed was sown on May 14, and the rate varied with the size of the seed, making an average of about three bushels per acre. The results obtained are as follows:—

VARIETY TEST OF FIELD PEAS

Variety	Date of ripening	No. of days maturing	Average length of plant	Actual yield of grain per acre
			inches	bush. lbs.
Arthur	Sept. 4	113	54	45 20
Black Eyed Marrowfat	Sept. 11	120	54	44 00
Golden Vine	Aug. 30	108	46	38 40
Canadian Beauty	Sept. 11	120	48	38 40

The Canadian Beauty which stands first on the list in the three-year average is a large white pea with good length of pod and vine. It does not seem to mature quite as evenly as some of the other varieties like Arthur and Golden Vine.

The Golden Vine which stands second in the three-year average is a small pea with fair length of vine and pod.

The Black Eyed Marrowfat is a medium-sized pea and has given fair results at this Station, standing third in the three year average.

The Arthur, which stands in fourth place in the three-year average is a good pea for this district. A large percentage of the pods are produced near the end of the vines and this seems to have a beneficial effect on the quality of the grain produced as they ripen evenly and produce a uniform sample of good quality.

These four varieties have been tested continuously for three years and the table which follows shows the average results obtained.

VARIETY TEST OF FIELD PEAS—THREE-YEAR AVERAGE

Variety	Number of days maturing	Actual yield of grain per acre	
		bush.	lbs.
Canadian Beauty	122·3	38	36
Golden Vine	118·3	36	30
Black Eyed Marrowfat	122·3	35	40
Arthur	115·6	35	10

VARIETY TEST WITH COMMON VETCH

Considerable common vetch seed is used in this section of Ontario in connection with the seeding of oats and peas for ensilage purposes. With the object of determining if vetch seed could be matured in this district, one variety, namely common vetch, was sown on May 14, in triplicate one-eightieth-acre plots on clover sod which had been spring-ploughed after it had been manured at the rate of sixteen tons to the acre. The seed was sown at the rate of one and one-half bushels per acre. The results obtained are as follows:—

VARIETY TEST OF VETCH

Variety	Date of seeding	Number of days maturing	Average length of plant	Actual yield of grain per acre	
			inches	bush.	lbs.
Common Vetch	Sept. 11	120	48	27	8

This is an encouraging yield, and as the seed is expensive, it may prove advantageous to produce it locally.

SPRING RYE

As rye is a crop which more or less cross fertilizes, it is difficult to test a number of varieties and still keep the seed pure. For this reason only one variety, the common spring rye, has been put under test to date in the regular plots. It was sown on May 5, in triplicate one-fortieth-acre plots at the rate of one and one-half bushels to the acre. The soil was a clay loam which had previously been in potatoes. The results obtained are as follows:—

VARIETY TEST OF SPRING RYE

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	
			inches		bush.	lbs.
Common Spring Rye	Sept. 10	128	48	6·0	41	24

The yield was good, but it seemed to take an unusually long period for the grain to ripen this year.

BUCKWHEAT

Two varieties of buckwheat were tested at this Station in 1923. The seed was sown in single one-twentieth-acre plots on June 19, at the rate of one bushel per acre. The results obtained are as follows:—

VARIETY TEST OF BUCKWHEAT

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
			inches		bush. lbs.
Silver Hull	Sept. 10	83	36	8·0	16 12
Rye Buckwheat	Sept. 10	83	30	9·0	11 32

It is true the yields are not high; but when it is considered how tender a crop buckwheat is, it is encouraging to know that it may be matured at all.

BEANS

Only one variety of beans was tried out in the cereal plots in 1923, Norwegian Ottawa 710. The seed was sown on May 30, in a one-fortieth-acre plot and the plants grew well until fall. They were pulled on September 29, and gave a yield of six bushels to the acre. The variety is a coloured bean, rather long in shape but of good quality. As beans are another tender crop it is encouraging to have them mature.

SUNFLOWERS

The Early Ottawa 76 sunflower was tried out in the cereal plots in 1923 for seed production. It was sown on May 12, and commenced to bloom on August 6. It was let stand until October 10, when the most mature heads were selected and cured for seed.

The Early Ottawa 76 is a very early variety, but it is quite possible that even some of the later varieties might also be matured if they were sown quite early.

FORAGE CROPS

Northern Ontario might be termed an ideal location for the production of forage crops. There are, however, a few of these crops which are easily affected by drought, such as mangels, and others again by frost, such as corn. On the other hand, the great majority of them, such as clover, alfalfa, sunflowers, oats as annual hay, peas as annual hay, fall and swede turnips and most of the grasses give excellent returns.

In connection with the forage crop work this year, a change has been made in the manner of arriving at the results. Heretofore, each plot of clover, grass, etc., was cured in the usual way and the weight of the cured material was taken as the final results. This year, however, all of the plots except those which were one-half acre in size, were weighed immediately after cutting and afterwards a part of the material was run through a cutting box, from which was taken a sample of two pounds of the grasses, clover, corn, sunflowers and O.P.V. and five pounds of the roots. These samples are dried in a drying house to constant weight and then sent to Ottawa to be dried to the moisture-free state.

The figures in the report this year show the yield per acre of green material and also the yield per acre of dry material as based on the percentage of shrinkage in the drying house. The one-half acre plots were weighed in the cured state and were also brought to the dry-weight basis.

As reported last year, the new seeding did not give promise of any results, owing to the extremely dry season. After these plots had been given ample time to develop this year, it was decided that the results would not be reliable nor representative, so that all of the plots seeded in 1922 were discarded and ploughed. This condition was indeed unfortunate and leaves our forage crop report unusually small for 1923, but this might better happen than to publish results which would not be representative and accurate.

The dry weather which continued this year until June 22, had a very detrimental effect on some of our forage work. For instance, the mangel crop was a complete failure, as not more than five per cent of the seed germinated. The abundance of moisture which prevailed during the latter part of the growing season, however, brought the other root crops, the annual hays, the clover and alfalfa, the corn and sunflowers, etc., along in good shape and most of these gave good results.

ENSILAGE CROPS

SUNFLOWERS.—Nine varieties of sunflowers were under test in 1923. The seed was sown on May 28, in triplicate one-fortieth-acre plots, on clover sod which had been spring-ploughed after it had been given an application of manure at the rate of sixteen tons to the acre. The rows were thirty inches apart and the plants were thinned to six inches apart in the row. They were all harvested on September 12.

The Mammoth Russian is ahead both in green and in dry material. It has always been first in yield and seems the best variety to use when large yields are sought for. Its green weight per acre in 1923 was 20 tons 240 pounds and 2 tons 997 pounds per acre dry weight.

Russian Giant gave 17 tons 560 pounds of green weight per acre and 2 tons 464 pounds of dry weight per acre. The Russian Giant, which is also a tall-growing large type of sunflower, similar in many respects to the Mammoth Russian, stood second. These are both rather late varieties as only one per cent of the Mammoth Russian was in bloom and four per cent of the Russian Giant.

The next three namely Manchurian, Early Ottawa 76 and Improved Mammoth Russian, are all fairly early, as they were fifty per cent and over in bloom at harvest time.

CORN.—Sixteen varieties of corn were under test in 1923. The seed was sown on May 30, in triplicate one-eightieth-acre plots on spring-ploughed clover sod which had been manured at the rate of sixteen tons to the acre previous to ploughing. The rows were thirty inches apart and the plants were thinned to about six inches apart in the row. The germination was fairly good and no damage was suffered from frost until the night of September 9, and the plots were all harvested on September 10, so that practically no shrinkage was caused by the freezing.

For some reason, up until the present, corn has never given large yields. It is encouraging, however, to have it succeeding as well as it has this year, even though the yields were not very heavy. It shows that a fair yield of silage will be obtained in a normal year.

Comptons, Longfellow and Western Yellow Dent, were the three leading varieties and gave the following green and dry weight per acre. Comptons, 14 tons and 1,520 pounds green weight and 1 ton 1,404 pounds dry weight per acre; Longfellow, 14 tons 1,280 pounds green weight and 1 ton 1,541 pounds

dry weight per acre; Western Yellow Dent, 13 tons 880 pounds green weight and 1 ton 1,349 pounds dry weight per acre. The corn was quite green when cut and this accounts for the heavy shrinkage.

ANNUAL HAYS

OATS AS AN ANNUAL HAY.—The objects of this experiment are to determine the suitability and productiveness of oats used as hay and to ascertain the most desirable varieties and the best time for harvesting to obtain the best results.

Thirteen varieties of oats were under test in this experiment in 1923. Twelve of the varieties were the same as those used in 1922 with O.A.C. No. 72 added. The seed was sown on May 11, in triplicate one-fortieth-acre plots on clover sod land which had been spring-ploughed after an application of manure at the rate of sixteen tons to the acre. The oats were seeded at the rate of two and one-half bushels per acre. The germination and growth were both fairly good, so that all varieties gave a reasonably good yield of good-quality hay. The plots were all harvested at three different stages of maturity as follows: one-third when the plants were in bloom (that is when the majority of the plants were shedding pollen), one-third when the plants were turning (when ten per cent of the top kernels of grain were light in colour), and the last third was cut when the plants were nearly ripe (when about ten per cent of the standing plants still showed a green tinge).

The three leading varieties in 1923 were Victory, Sensation and Gold Rain. All of the varieties gave a good yield of good-quality hay. The following table shows the average yield of all varieties cut at the different stages:—

AVERAGE YIELD OF ALL VARIETIES AT DIFFERENT STAGES OF MATURITY

Stage of Maturity	Yield per acre in 1923 green weight		Yield per acre dry weight 1923		Average yield per acre green weight for 1922–1923		Average yield per acre dry weight 1922–1923	
	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.
When in bloom	4	1,967·6	1	1,372·9	4	75·8	1	419·0
When turning	5	938·4	2	372·2	4	852·5	1	1,471·6
When nearly ripe	4	187·6	2	610·6	3	704·1	1	1,442·8

This table with one exception indicates that the greatest weight of both green and dry matter is obtained when the oats are turning. In palatability there is not much to choose between the first two stages of maturity, either in the green or dry state, but both of these are decidedly superior to the third cutting.

PEAS AS ANNUAL HAY.—The objects of this experiment are to determine the suitability and productiveness of peas as a hay crop and also to ascertain the most desirable varieties for hay purposes in this district. Four varieties were under test in 1923. The seed was sown on May 14, in triplicate one-eightieth-acre plots on spring-ploughed clover sod which had been given an application of manure at the rate of sixteen tons to the acre previous to ploughing. The rate of seeding varied with the size of the peas and ran from two and one-half bushels to three and one-half bushels per acre. The Golden Vine plots were harvested on August 16, and the other three varieties on August 27. The germination was good and the growth was rapid, so that all varieties gave a big yield of green and dry material. The results obtained are as follows:—

VARIETY TEST OF PEAS AS ANNUAL HAY

Variety	Yield per acre green weight		Yield per acre dry weight 1923		Average yield per acre green weight 1922–1923		Average yield per acre dry weight 1922–1923	
	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.
Black Eyed Marrowfat	13	1,680	4	15	11	720	3	8·5
Arthur	12	1,600	3	262	10	1,750	2	1,073·5
Canadian Beauty	11	1,840	3	761	10	70	2	1,010·5
Golden Vine	10	80	3	509	10	1,740	2	1,668·0

As may be noted, peas give a big yield of both green and dry material per acre. In palatability, however, they are not relished by the stock nearly as much when grown alone as when grown in a mixture with oats, or oats and vetch.

VETCHES AS ANNUAL HAY.—The object of this experiment is to determine the suitability and productiveness of vetches as annual hay. One variety of vetch, namely, common vetch, was seeded on May 14, in triplicate one-eightieth-acre plots on the same kind of soil and which received similar treatment to that on which the pea plots were seeded. In former years the vetch alone has not been giving much of a yield, but this year it gave very good results indeed. The plots were harvested on August 27. The results obtained are as follows:—

VETCHES AS ANNUAL HAY

Variety	Yield per acre green weight 1923		Yield per acre dry weight 1923		Average yield per acre green weight 1922–1923		Average yield per acre dry weight 1922–1923	
	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.
Common Vetch	11	00	2	1,676	6	1,000	1	1,536

SWEET CLOVER AS ANNUAL HAY.—The object of this experiment is to compare the yields of hay obtained from white-blossom sweet clover, yellow-blossom sweet clover and Hubam, which is an annual sweet clover, the same year as seeded. The above three varieties were sown in 1923, in triplicate one-fortieth-acre plots without a nurse crop. The seed was sown on May 23, on fall-ploughed clay loam soil which had previously produced a crop of sunflowers. For some reason sweet clover has never done well at this Station. On account of fairly dry weather this year up until June 22, the seed did not seem to germinate well and as a result, all of the plots had a patchy appearance. While none of the plots gave a large yield, the Hubam seemed to develop much more rapidly than did either the white or yellow blossom. The plots were all harvested on October 5. The results obtained are as follows:—

VARIETY TEST OF SWEET CLOVER AS ANNUAL HAY

Variety	Average height of plants	Yield per acre green weight 1923		Yield per acre dry weight 1923	
	inches	tons	lbs.	tons	lbs.
Hubam	36	5	1,640	1	1,527
Yellow Blossom	18	2	560	0	1,132
White Blossom	18	1	680	0	767

This experiment will be continued for a number of years until conclusive deductions may be drawn.

FIELD ROOTS

MANGELS.—Twenty-six varieties of mangels were under test in 1923. The seed was sown on May 26, in triplicate one-eightieth-acre plots on spring-ploughed clover sod which had been given an application of manure at the rate of sixteen tons to the acre previous to ploughing. The soil was well disked and apparently put in good condition before the seed was sown; but owing to dry weather for almost a month after seeding, plus too much rain when it did come, seemed to pack the soil so hard and close around the seed that the air was partly cut off, only about five per cent of the seed germinating. As a consequence no results were obtained. The seed was sown on the flat and it is possible the way the weather turned out afterwards that they might have given better results had they been sown in drills.

Experimental Methods.—The objects of this experiment are to determine the number of times it is necessary to repeat experimental plots before the maximum of accuracy and the minimum of variation are obtained, and also to determine the effect that a mangel of the long type has on the development and yield of a mangel of the short type in the adjoining row. For this experiment, five varieties of mangels were selected including representatives of the five main types, namely, long, half-long, intermediate, tankard and globe or round. Each of these varieties was repeated thirty-six times in one-eightieth-acre plots consisting of three rows each. The experiment is a particularly valuable one, and it was particularly unfortunate that the seed of these varieties, as well as the seed of the variety test, failed to germinate, as it was hoped some very valuable data would have been obtained. This experiment will be tried again another year, possibly including turnips in the test as well as mangels.

SWEDE TURNIPS.—Twenty-six varieties of swede turnips were under test in 1923. The seed was sown on May 26, in triplicate one-eightieth-acre plots on clover sod which was given an application of manure at the rate of sixteen tons to the acre and afterwards ploughed. The rows were thirty inches apart and the plants were thinned to twelve inches apart in the row. Unlike mangels, the turnip seed germinated well, the plants grew satisfactorily and developed into a fair crop of good quality roots.

The plots were all harvested on October 15, 16 and 17, and the three leading varieties were Bangholm, Bangholm Lyngby, and Magnum Bonum.

Fairly good results were obtained from swede turnips this year, as the average yield of the twenty-six varieties under test was 14 tons 156.9 pounds green weight and 1 ton 1137.34 pounds dry weight per acre. The swede turnip is a fairly sure crop in this section and as they are good keepers they may be used as a succulent feed for stock during the whole winter.

FALL TURNIPS.—Fifteen varieties of fall turnips were under test in 1923. The seed was sown on May 28, in triplicate one-eightieth-acre plots on the same kind of soil similarly treated to that on which the swedes were sown. The rows were thirty inches apart and the plants were thinned to one foot apart in the row. Germination was fairly good and most of the varieties gave large yields of good quality turnips for fall varieties which kept well and were relished by the cattle. They were harvested on October 28. The three leading varieties were Fynsk Bortfelder, Dales Swede and Purple Top Mammoth.

The average yield of the fifteen varieties under test was 22 tons 96 pounds green weight and 1 ton 1150.13 pounds dry weight per acre, which goes to show that they may be employed as a source for an abundance of succulent feed for late fall and early winter feeding of livestock. Their outstanding characteristics are rapid growth and big yields. Generally speaking they are only fair keepers, although some of the more round and firm varieties like the Hardy Green Round will keep fairly well for a considerable length of time if properly stored.

Date of Seeding Fall Turnips.—The objects of this experiment are to compare the results obtained in yield and keeping quality of fall turnips when seeded at intervals of one week from fairly early in the spring until about the end of July. The Hardy Green Round was the variety used and the dates of seeding ranged from May 26 to June 30. They were seeded in triplicate one-eightieth-acre plots on clover sod which had been spring-ploughed after it had been given an application of manure at the rate of sixteen tons to the acre. The turnips were harvested on October 24, and ten average roots from each date of seeding were stored in the root cellar as a test in keeping quality.

The largest yield was obtained from the seeding on June 9, which gave 18 tons 1,600 pounds. In keeping quality practically no difference has showed as yet, but later on in the winter it may be found that some of the roots will keep better than others.

FIELD CARROTS.—Thirteen varieties of field carrots were under test in 1923. The seed was sown on May 28, in triplicate one-eightieth-acre plots, on the same kind of soil similarly treated to that on which the turnips were sown. The rows were thirty inches apart and the plants were thinned to four inches apart in the row. Germination was reasonably good and a fair yield was obtained of good quality carrots. They were harvested on October 25.

The average yield of the thirteen varieties under test was 4 tons 566.1 pounds per acre of green weight and 997 pounds per acre of dry weight, indicating that fairly good yields may be obtained from field carrots.

The improved Short White, Large White Belgian and Danish Champion, are all showing particularly good results over the other varieties under test this year.

The carrot is an excellent feed particularly for horses and acts as a conditioner if not fed in too large quantities.

LEGUMES AND GRASSES

HAY PRODUCTION FROM GRASSES ALONE AND IN COMBINATION WITH CLOVERS

The objects of this experiment are to compare the results obtained in yield and quality of hay produced from timothy, orchard grass and meadow fescue, when 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, and also to compare the results when these mixtures are sown with and without a nurse crop.

The first series of this experiment was seeded in 1920, and in 1921 two cuttings of hay were taken off these plots. In 1923 only one crop of hay was

taken off. In 1921 this experiment was repeated and then again in 1922. The 1922 seeding failed to catch so that the results this year are from the third year of the plots seeded in 1920, and the second year of the plots seeded in 1921.

Comparing the results obtained from the plots seeded down with a nurse crop and those which were seeded down without a nurse crop, we find that the average yield of cured hay in 1921 from all plots seeded without a nurse crop in 1920 was 3 tons 1,331.6 pounds per acre, while those seeded with a nurse crop gave an average yield of 4 tons 1,346 pounds per acre. In 1922 the average yield of cured hay from these same plots was 1 ton 1,025 pounds per acre from those seeded without a nurse crop and 1 ton 710 pounds per acre from those seeded with a nurse crop, while the average of the two years equalled a yield of 2 tons 1178.3 pounds per acre from those seeded without a nurse crop and 3 tons and 28 pounds per acre from those seeded with a nurse crop. In 1923 a yield of 2 tons 1723.3 pounds per acre of green weight and 1273.2 pounds per acre of dry weight was obtained from those same plots seeded without a nurse crop and 3 tons 438.3 pounds per acre of green weight and 1490.2 pounds per acre of dry weight was obtained from those seeded with a nurse crop. All of these results would seem to indicate that it does not pay to seed out the common hay mixtures without a nurse crop.

It may be noted that there is quite a discrepancy between the shrinkage of the different mixtures from the green to the air-dried basis. This is most noted where the green yields were rather heavy.

There does not seem to be any outstanding difference between the yielding ability of timothy, meadow fescue, and orchard grass. The timothy has one advantage over the other two, in that it may be cut over a longer period of time and still make fairly good hay, that is, after it is just right for cutting it will stand without being cut longer with less deterioration in quality. The orchard grass seems to make more rapid growth early in the spring, say up to June 1, than either timothy or fescue.

This experiment was seeded again in 1923, in triplicate one-fortieth-acre plots using barley as a nurse crop and from all appearances a nice stand was obtained.

TIMOTHY AND CLOVERS FOR HAY PRODUCTION

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

The results obtained from this experiment in 1923 are from ten one-half-acre plots which were seeded in 1921, using barley as a nurse crop. The soil was a mixture of muck and clay which had previously produced a crop of sunflowers and apparently it was not very uniform as the results are somewhat conflicting. The yield from these plots in 1922 was reported in that year's report; the heaviest yield of cured hay in 1923 was from the following rates of seeding: timothy eight pounds, red clover four pounds, and alsike four pounds. This is not generally the case as the heavier seeding usually gives the better results.

The results of this experiment to date are not consistent enough to draw any definite conclusions. It was repeated again in 1923, in triplicate one-fortieth-acre plots and more reliable data should be obtained by another year.

BROME GRASS

The objects of this experiment are to determine the suitability and productiveness of this grass as a hay crop for this district. In 1921, a one-tenth-

acre plot was seeded on May 23, in rows twelve inches apart without a nurse crop. In 1922 it gave a yield of 2 tons 1,350 pounds of good quality hay per acre from one cutting, but during the winter of 1922-23 the plants all died, indicating that it is short-lived in this district. The experiment has not been repeated again.

PERENNIAL RED CLOVER

The object of this experiment is to ascertain if a strain of red clover showing perennialism at Ottawa will show the same character here.

In 1921, a one-tenth-acre plot was seeded on May 26, in drills twelve inches apart on well-drained clay loam soil without a nurse crop. In 1922 it gave a yield of two and one-half tons per acre of cured hay. In 1923 the yield was 4 tons 1,600 pounds per acre green weight, and 1,705 pounds per acre dry weight.

A large percentage of the plants seemed as healthy and vigorous as ever this fall when the plot was ploughed up with the rest of the field, indicating that the clover has real perennial characteristics.

NITRO CULTURE ON RED CLOVER

The object of this experiment is to compare the results obtained in yield and quality of hay produced from red clover when seeded with and without nitro culture treatment. In 1921, two one-tenth-acre plots were seeded on August 25, with red clover on heavy clay loam soil. The results in 1923 are as follows:—

NITRO CULTURE ON RED CLOVER

Treatment given	Green weight per acre 1923		Dry weight per acre 1923	
	tons	lbs.	tons	lbs.
Treated	8	50	2	858
Untreated	7	1,460	2	14

In 1922, the untreated plot outyielded the one which was treated and in 1923 the results on the same plots are reversed, so that no definite deductions can as yet be drawn. It is quite evident, however, that as great a benefit does not occur from treating red clover seed with ntiro culture as does from the treatment of alfalfa seed. This is explained by the fact that red clover is indigenous to this country, while alfalfa is a comparatively new introduction. This experiment was repeated in 1923.

METHODS OF SEEDING ALFALFA FOR HAY PRODUCTION

The objects of this experiment are to compare the results obtained in yield and quality of hay produced from alfalfa seeded broadcast at the rate of twenty pounds per acre with seeding in rows twelve inches apart, and also to compare the results obtained from plots seeded with a nurse crop with those seeded without.

The first series was seeded on May 28, 1920, on a clay knoll which had previously produced a crop of turnips. The soil was given an application of lime at the rate of two tons to the acre previous to seeding. The Grimm variety of alfalfa was used and the seed was treated with nitro culture.

The second series was seeded on May 18, 1921, on soil that was more level, but otherwise the treatment given was the same. The following figures give the results obtained in 1923 from these two series, and also the average results obtained for three years.

The plots seeded in 1920 gave an average yield of 1 ton 1,081 pounds per acre in 1921; 3 tons 1,129 pounds per acre in 1922, and 3 tons 379 pounds per acre in 1923, indicating that the alfalfa does not come to its best yielding capacity until the second year.

The plots seeded in 1921 gave an average yield of 1 ton 1,687 pounds per acre in 1922 and 2 tons 1,887 pounds per acre in 1923, again indicating that alfalfa gains in yielding capacity until at least the second year.

Cutting alfalfa, July 12, 1923.

The average yield of cured hay from all plots which have been cut to date and which were seeded with a nurse crop equals 2 tons 718.6 pounds per acre, while the average yield from all cuttings to date taken from those plots which were seeded without a nurse crop equals 2 tons 1,351.1 pounds per acre, indicating that as large a yield of alfalfa need not be expected if the seed is sown with a nurse crop. Alfalfa would appear to be the one outstanding crop for which, in seeding, it would pay to sacrifice the nurse crop. This is not only because the first and second crops are heavier if so seeded, but also because the alfalfa is a long-lived plant and gives at least two cuttings of high quality hay for a number of years, and as such it pays to make some special effort in getting a good stand. A hardy variety like Grimm or Ontario variegated should be used. It should be sown on well-drained soil and if there is any chance that the soil might be sour, it should receive an application of good limestone at about two tons per acre previous to seeding. The seed should most certainly be treated with nitro culture, particularly if alfalfa has not been grown on the land before.

NITRO CULTURE ON ALFALFA

The object of this experiment is to compare the results obtained in yield and quality of hay produced from alfalfa when seeded with and without nitro culture treatment. In 1921, two one-tenth-acre plots were seeded with Grimm alfalfa, on heavy clay loam soil without a nurse crop. The results obtained in 1923 from these plots are as follows:—

NITRO CULTURE TREATMENT OF ALFALFA SEED

Results in 1923 from plots seeded in 1921

Treatment	Green weight per acre first cut		Green weight per acre second cut		Total green weight per acre		Total dry weight per acre	
	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.
Treated	7	1,000	3	450	10	1,450	3	1,465
Untreated	6	1,040	3	250	9	1,290	3	967

In 1923, the treated plot gave 1,360 pounds per acre more of cured hay than the untreated plot, while in 1923 the treated plot gave only 1,160 pounds of green weight and 498 pounds of dried weight more than the untreated, indicating that a great advantage is obtained the first year and some even the second by treating the seed with nitro culture.

The experiment was repeated in 1923, using triplicate one-fortieth-acre plots and a remarkable difference could be noted in the colour, stand and general appearance of the plots in favour of those which had been treated.

THE PRODUCTION OF SEED

RED CLOVER SEED PRODUCTION

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

In 1920, the first series of this experiment was seeded on May 22, in duplicate one-half-acre plots on well-drained heavy clay loam soil, using spring wheat as a nurse crop. In 1921, the second series of this experiment was seeded in duplicate one-half-acre plots on clay loam soil using oats as a nurse crop.

Comparing the results obtained from first and second cutting of red clover for seed production, it is found that the yield of seed from the second crop are almost nil and apparently could not be depended upon in average years. The results would also indicate that broadcasting the seed is just as efficient and possibly gives a little larger yields than seeding in rows twelve inches apart, and this is even more in evidence when compared with the results from the plots which were seeded in rows twenty-four inches apart.

In monetary returns it is found that, giving the clover hay, clover straw and the seed local market values and considering the low yields of seed which have been obtained for the last three years, the production of hay is really the better paying proposition. This should not be taken, however, as an argument or justification for any farmer not producing at least sufficient seed for his own use, when a clover huller or an adjusted threshing mill is available.

This experiment was repeated in 1923, and the accumulated data will become more reliable as time goes on.

ALSIKE SEED PRODUCTION

The object of this experiment is to compare the results obtained in yield and quality of seed produced from alsike when sown broadcast, in rows twelve inches apart and in rows twenty-four inches apart.

The results obtained in 1923 are from single one-half-acre plots which were seeded on May 17, 1921, on clay loam soil using oats as a nurse crop. The following table gives the results obtained in 1923 together with the average results for three years 1921-23.

METHODS OF SEEDING ALSIKE FOR SEED PRODUCTION

Method of seeding	Yield of seed per acre 1923		Average yield of seed for two years 1922-1923	
	bush.	lbs.	bush.	lbs.
Broadcast 5 pounds per acre	2	0	2	12
Rows 12 inches apart	2	4	2	17
Rows 24 inches apart	1	40	1	45

For some reason these plots have never given as large yields as they should. This experiment is repeated again in 1923, using triplicate one-fortieth-acre plots and more representative yields should be available in 1924 from these new plots.

As may be noted from the table there is not much difference between the yields from the various methods of seeding, the broadcast and rows twelve inches apart being practically the same, while the rows twenty-four inches apart give a slightly lighter yield.

TIMOTHY SEED PRODUCTION

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

The results obtained in 1923, are from duplicate one-half-acre plots which were seeded in 1921, on a soil which was mostly muck, using oats as a nurse crop. The following table gives the results obtained in 1923 and the average for the two-years 1922-23.

METHODS OF SEEDING TIMOTHY FOR SEED PRODUCTION

Method of seeding	Amount of seed sown per acre	Yield of seed per acre in 1923		Average yield of seed per acre 1922-1923	
	pounds	bush.	lbs.	bush.	lbs.
Broadcast Timothy	10	0	108	0	84
Broadcast Red Clover	8	..	..	..	..
Broadcast Timothy	10	3	000	2	36
Rows 12 inches apart	.....	2	36	2	33
Rows 24 inches apart	.....	3	28	2	38

The yields of seed have never been heavy on these plots and the difference between the various methods of seeding is apparently not very marked.

The experiment was repeated again in 1923, in triplicate one-fortieth acre plots using barley as a nurse crop.

ALFALFA SEED PRODUCTION

A start has been made at this Station in connection with the production of alfalfa seed. In 1923, a one-quarter acre plot of alfalfa, which was seeded broadcast in 1920 with a nurse crop and was showing a remarkable profusion of bloom, was left uncut at haying time in order to determine what results would be obtained in seed production. The plot was harvested with the mowing machine on September 6, and when threshed, yielded at the rate of three bushels and twenty pounds to the acre of fair quality seed.

This is encouraging, and it is the intention to establish some regular experiments in 1924 in connection with the production of alfalfa seed.

KENTISH WILD WHITE CLOVER

The objects of this experiment are to determine if a strain of Kentish wild white clover imported from Europe will withstand the climatic conditions of this district and also to determine whether it will produce seed.

For this experiment, four acres of clay loam soil which were fall-ploughed was seeded on May 19, 1922, to Kentish wild white clover, at the rate of ten pounds to the acre, using oats as a nurse crop. The growing season of 1922 turned out to be so dry that practically all of the other new seeding appeared decidedly thin after harvest, but the Kentish clover made a fairly good stand. It came through the winter in good condition and developed into a thick crop, with fairly short stems, and gave continuous bloom rather than maturing evenly. As one of the objects was to obtain some seed if possible, the crop was let mature until August 29, when it was cut with the mowing machine on which a buncher was attached. As the weather was unfavourable for the curing of clover seed, it was found almost impossible to get it in proper shape for threshing as it was green when cut and needed a lot of hot dry weather to cure. It was finally threshed, when eight and one-half pounds of fair quality seed were obtained.

As may be noted, the yield of seed did not amount to much, but this clover looks promising as a pasture plant for this district, as it appears to grow so thickly that it should produce an abundance of luxuriant pasture and at the same time keep in check any weeds that might under other crops become established.

POULTRY

In 1921, work with poultry was begun at this Station, and the plant has gradually increased until at the present time it consists of the following buildings: one frame poultry house, capacity 100 birds; one frame breeding house, which accommodates 125 birds; two log poultry houses, capacity 100 birds each; and six colony houses.

The flock numbers three hundred and eighty birds, the breed being Barred Plymouth Rocks. This breed is well adapted to northern climatic and market conditions. The birds are of good size, reasonably hardy, and make a good showing in egg production.

The experimental work of the plant has been along the lines of comparing breeding, feeding, housing and general management methods.

SKIM-MILK VERSUS BEEF SCRAP

With the idea of obtaining some reliable data relative to the comparative value of skim-milk and beef scrap as a source of animal protein for winter egg production, an experiment was commenced on November 1, 1921, and continued until April 30, 1922, covering the six winter months. The results of that

year's work was published in last year's report. The experiment was repeated again in 1922-1923 for a period of five months, December 1 to April 30. For this experiment forty of our best year-old hens were divided into two pens of twenty birds each with equal egg production and about equal weights. The ration fed to each pen was the same with the exception of the skim-milk and beef scrap. The experiment was duplicated with twenty-four pullets which were housed in a colony pen divided so as to accommodate twelve birds in each end. Birds on beef scrap had it before them at all times in their hoppers, while those on milk got no beef scrap, but had all the skim-milk they would take.

In 1921-22, the beef scrap was mixed with the mash, but in 1923 it was hopper fed. The scratch ration for all pens was the same, and consisted of two parts each of whole wheat and cracked corn and one part each of whole oats and barley. The mash was the same for all pens and consisted of equal parts of bran, shorts, corn meal, ground oats and ground barley.

The following tables give the results obtained with the year-old hens and the pullets in 1922-23 and also an average of the results obtained from all pens under test to date including the experiment in 1921-22:—

SKIM-MILK VERSUS BEEF SCRAP

Stock	Animal feed	Cost of animal feed	Total cost of feed	Eggs laid	Value	Cost per doz.	Profit over cost
		$ cts.	$ cts.		$ cts.	c.	$ cts.
Hens	Beef scrap	3 76	21 66	1,013	50 65	25·6	28 99
Hens	Milk	3 63	22 86	892	44 60	30·7	21 74
Pullets	Beef scrap	1 98	15 01	363	18 35	49	3 34
Pullets	Milk	2 22	15 07	420	21 00	43	5 93

SKIM-MILK VERSUS BEEF SCRAP

AVERAGE OF TWO YEARS' RESULTS

Year	Stock	Animal feed	Cost of animal feed	Total cost of feed	Eggs laid	Value	Cost per doz.	Profit over cost
			$ cts.	$ cts.		$ cts.	c.	$ cts.
1921-22 and 1922-23	Pullets and hens.	Beef scrap	3 48	29 97	964·6	46 62	39	16 65
		Milk	4 88	31 22	1,099·6	53 48	36	22 26

This experiment would seem to indicate that:—

(1) Skim-milk is preferable for pullets.

(2) Birds receiving skim-milk eat less of other feeds and thus production costs are decreased.

(3) Farmers may well use skim-milk as a source of animal protein for laying hens.

(4) If skim-milk is not available, beef scrap will give satisfactory results.

SPROUTED OATS VERSUS CLOVER

With the object of comparing the results obtained when clover leaves are used as a green feed versus sprouted oats, an experiment was conducted at this Station from December 1, 1922 to April 30, 1923. For this test one hundred pullets were selected and placed in a one-hundred-bird log poultry house. The

birds were divided equally as to age, weight and general development and fifty put in each end of the house. The ration fed each pen was the same, with the exception of the variety of green feed given. One lot of birds got all the sprouted oats they would take, in troughs, besides their regular ration, while the other lot got all the clover leaves they would handle. The clover leaves were left in a slatted hopper.

The scratch ration consisted of two parts each of whole wheat and cracked corn and one part each of whole oats and barley. This was fed morning and evening in the litter. The meal mash consisted of equal parts of bran, shorts, ground oats, ground barley and corn meal plus ten per cent tankage. Besides the above, beef scrap, grit, shell and charcoal were open to the birds in the hoppers at all times. The prices charged for the feeds were the average market prices covering the year and the selling price of eggs was at an average rate of sixty cents per dozen. The results obtained are as follows:—

SPROUTED OATS VERSUS CLOVER

Green feed	Cost of green feed	Total cost of feed	Eggs laid	Value	Cost per doz.	Profit over cost
	$ cts.	$ cts.		$ cts.	c.	$ cts.
Sprouted oats	3 97	52 47	16·70	83 50	37·7	31 03
Clover leaves	1 47	45 58	16·16	80 80	33·8	35 22

The above table would seem to indicate that birds getting sprouted oats as a green feed may produce a few more eggs per bird than those getting clover leaves, but at a slightly higher cost per dozen. The birds getting the sprouted oats devoured a greater quantity of other feeds, particularly the beef scrap which is an expensive feed and one which was always accessible. It would seem to indicate also, that if birds are given a plentiful supply of clover leaves in a hopper at all times, they will give about as good results as with sprouted oats and the labour required is much less.

AGE OF BIRDS AND WINTER PRODUCTION

The object of this experiment is to compare the results obtained in winter egg production from early pullets, late pullets, year-old hens and two-year-old hens. Ten birds, representing the very best we had in each of the ages, were housed under the same conditions and given equal treatment in every way. The only point of difference was the various ages of the birds included. The experiment covered a period of five months from December 1, 1922, to April 30, 1923.

They were housed in colony pens, divided so as to accommodate ten birds in each end. Their scratch ration consisted of two parts each of whole wheat and cracked corn and one part each of whole oats and barley. This was fed morning and evening in the litter. The meal mash consisted of bran, shorts, ground oats, ground barley and corn meal in equal parts plus ten per cent tankage. This was hopper-fed and was always available. There were also beef scrap, shell, grit and charcoal in the hoppers at all times. All of the birds which commenced the test stayed in good health and no casualties occurred. The following table gives the results obtained:—

AGE OF BIRDS AND WINTER PRODUCTION

Stock 10 birds in each lot	Cost of feed	Eggs laid	Value	Cost per doz.	Profit over cost
	$ cts.		$ cts.	c.	$ cts.
Yearlings	14 46	368	18 40	47	3 94
Two-year-olds	14 78	303	15 15	59	0 37
Early pullets	14 31	455	22 75	38	8 44
Late pullets	15 45	243	12 15	76	−3 30

The results of this experiment would seem to indicate rather vividly the advisability of having early pullets as winter layers. In fact, it will be noted that the year-old hens and even the two-year-old hens gave a greater production of eggs and at a much reduced cost per dozen than the late pullets. It must also be remembered, that the yearling and two-year-old hens in this experiment were all selected on egg production and every one of them had records of over one hundred and fifty eggs in their pullet year. This of course was impossible in connection with both the early and late pullets, they having to be selected entirely on appearance and breeding.

CRATE FATTENING

The direct objects of this experiment are to determine (1) if crate fattening cockerels is profitable; (2) if home-grown feeds are suitable for crate fattening; (3) if it pays to purchase a commercial feed like corn and add it to the home grown feeds; (4) if it would pay to use all commercial feeds rather than all or part home grown; and (5) if tankage and water could take the place of skim-milk in a fattening ration.

The results of the 1922 experiment have already been given in that year's report. The experiment was repeated this year with two lots of birds under the same arrangement as last year. Seventy-two birds were selected and equally divided as to weight and general development and placed in six crates, each of which had three compartments holding four birds. They were all housed in the same quarters and fed the following rations: pen 1, oats one part, barley one part, wheat one part and skim-milk; pen 2, oats one part, barley one part, wheat one part, tankage 15 per cent and water; pen 3, oats one part, barley one part, wheat one part, corn one part and skim-milk; pen 4, oats one part, barley one part, wheat one part, corn one part, tankage 15 per cent and water; pen 5, oat flour one part, corn one part, shorts one part and skim-milk; pen 6, oat flour one part, corn one part, shorts one part, tankage 15 per cent and water. The oats, barley, wheat and corn, were all finely ground and the coarser hulls were sifted out of the oats and barley. The feeds were all charged at average market prices for the past year as follows:—

Oats	$1 75 per cwt.
Barley	2 00 "
Wheat	2 50 "
Corn	2 50 "
Shorts	1 50 "
Oat flour	2 44 "
Tankage	3 50 "
Milk	0 50 "

Each experiment covered a period of twenty-one days or forty-two feedings. The first lot this year was fed from October 19, to November 9, while the second lot was fed from November 15, to December 6. Practically all of the birds kept a good keen appetite throughout the test. The following table

gives the results obtained and also the average results for the two years, including the three lots:—

CRATE FATTENING EXPERIMENT

Pen	Weight at beginning	Weight at end	Value at beginning	Value at end	Increase in value	Value total feed	Net profit per pen
	lbs. oz.	lbs. oz.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1. Early	51 12·0	71 14·0	15 53	21 56	6 03	2 54	3 49
Late	46 06·0	65 06·0	13 91	19 61	5 70	2 45	3 25
Average two years	47 1·9	69 1·3	14 14	20 72	6 58	2 58	4 00
2. Early	51 11	69 14	15 51	20 96	5 45	1 93	3 52
Late	46 0	61 14	13 80	18 56	4 76	1 89	2 87
Average two years	46 7·5	63 7·6	13 95	19 15	5 20	1 98	3 23
3. Early	51 13	71 13	15 54	21 54	6 00	2 56	3 44
Late	47 02	67 06	14 13	20 21	6 08	2 59	3 49
Average two years	47 7·6	70 09	14 24	21 17	6 93	2 64	4 29
4. Early	51 10	66 6	15 49	19 91	4 42	2 15	2 27
Late	45 14	63 8	13 76	19 05	5 29	1 86	3 43
Average two years	46 6·6	63 8·6	13 93	19 07	5 14	2 07	3 07
5. Early	51 12	75 0	15 53	22 50	6 97	2 33	4 64
Late	47 12	66 4	14 32	19 87	5 55	2 27	3 28
Average two years	46 14·6	69 3·9	14 08	20 77	6 69	2 40	4 29
6. Early	51 7	70 12	15 43	21 23	5 80	1 93	3 87
Late	48 12	62 12	14 62	18 82	4 20	1 67	2 53
Average two years	46 10·3	67 2·6	14 02	19 95	5 93	1 88	4 05

It may be said that:—

(1) Crate fattening is profitable.

(2) Home-grown feeds are suitable for crate fattening.

(3) It is advantageous to purchase corn meal to add to the home-grown ration.

(4) If home-grown feeds are available there is no advantage in buying commercial feeds.

(5) Tankage and water cannot profitably replace milk in the fattening ration.

The crates used in fattening are six feet long, sixteen inches wide, and twenty inches high, inside measurements. Each crate is divided by two solid partitions into three compartments and each of these will accommodate four birds.

Good, healthy birds should be selected for crate fattening. They should be starved for about twenty-four hours before being crate-fed and then the feed should be increased gradually. If a bird once loses its appetite from being overfed early in the fattening period, the chances are that it will not get going properly again and will not make much gain.

BEES

On October 21, 1922, nine colonies of bees were placed away in winter quarters. Of these, four colonies were wintered out doors in a four-colony wintering case, which allowed for three inches of packing material to be placed on all sides and underneath, with ten inches on the top. Of these four colonies, two came out alive and in good condition in the spring. The packing used was dry clover, which is not supposed to be as good for this purpose as well dried planer shavings.

The five colonies which were placed in the office cellar all came through alive; but three of them were queenless. The queenless colonies were united with those having queens, and this reduced the number of colonies, spring count, to four.

The colonies wintered outside were removed from the wintering case on May 17, and those wintered in the cellar were removed to outside quarters on May 4. An outer case packed with shavings was placed around each brood chamber and left there for the entire season.

As in former years, one colony was placed on scales and a dairly record kept of the gain or loss in weight. Notes were also made on the daily climatic features in order that the effect of the weather on honey flow could be determined. Like last year, the honey flow was very light this season. There was plenty of moisture after June 22, but the days were often cool and nectar did not appear to be produced in large quantities. The results of the hive on the scales are as follows:—

RECORD OF HIVE ON SCALES IN 1923

—	May	June	July	Aug.	Sept.	Total
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Gains	.....	23·0	82·0	34·0	19·0	146·0
Loss	12	.....	.....	.....	.....	.....

It will be noted that the month of July gave the largest honey flow. This is usually the case, but in 1922, the month of July gave a loss of one-half pound.

Alsike commenced to bloom about the middle of June; but the hive on the scales made some increase before this, the first increase recorded was on June 3. The greatest flow of nectar occurred on September 6, which is unusually late in the season for the largest gains. There was considerable fire weed in bloom at this time however, and the hive on scales gained eight pounds in the one day.

During the summer, the four colonies were increased to nine. Mated queens from Ottawa were placed in the new colonies. This increase replaced those lost during the winter.

It must be noted that one increase was made from the colony on the scales as well as from the other three and this would affect the total yield of honey from this colony for the season. The following statement gives the details of the season's operations:—

FINANCIAL STATEMENT OF APIARY IN 1923

Total weight of honey extracted from original 4 hives	124	pounds
Average weight produced per colony, spring count	31·0	"
Selling price of extracted honey per pound	$ 0·25	
Total value of honey produced	$31·00	
Average value of honey produced per colony	$ 7·75	

QUEEN MATING YARD

In order that the standard of bees may be maintained on the Central Farm and the branch Farms it is absolutely essential that the queens be reared from non-swarming and pure parentage and mated with selected and desirable drones. In order to control the mating of queens it is necessary that this work be conducted in a locality where no other bees are kept. Kapukasing offers such conditions and a queen mating yard was started during the past season.

The services of a beekeeper were secured for the summer season, and on July 4, nine double and two single nuclei arrived from Ottawa with twenty virgin queens; also two standard colonies for brood production. On examination it was found that eighteen of the queens were alive. Two weeks later twenty more nuclei were received.

Drone traps were placed on all hives in the regular yard and the queen mating yard was placed at a considerable distance from the other so that all of the virgin queens would be mated by the selected drones. As each batch of queens became mated and commenced to lay, they were sent to Ottawa, or elsewhere in accordance with instructions received from time to time from the Dominion Apiarist. This work was carried on from July 5, until the end of September. The following table gives the details of the queen mating work for the season:—

QUEEN MATING

Date received	Number received	Number alive	Number mated
July 4	20	18	16
July 11	20	17	14
July 14	7	7	5
July 20	20	20	15
July 27	4	4	2
July 31	30	28	21
Aug. 10	10	10	8
Aug. 11	10	10	3
Aug. 20	14	14	8
Totals	135	128	92

After the queen mating season was over, the nuclei were all united into seven strong colonies and fed a sufficient quantity of syrup to carry them through the winter. Six of these were placed in the office cellar on November 7 and the other one, which had a jumbo brood chamber, was placed in one of the wintering cases in the bee-yard on October 9. The nine colonies belonging to the original yard were fed a sufficient supply of syrup and seven of these were placed in four colony wintering cases on October 8 and 9, while the other two were placed in the office cellar on November 7. The wintering cases are made larger this year, so that six inches of dry shavings was placed on all sides and the bottom, and ten inches on the top. The covers were removed from the hives and they were placed tightly together in the case, two facing the east and two facing the west.

Bridges the full width of the entrance to the hives were constructed from the hive to the wall of the wintering case and here they were reduced to just sufficient size, so that the dead bees might be carried out without difficulty. The last two seasons have been very discouraging for bee keepers in this part of northern Ontario, as the honey flow has been particularly light, but it is encouraging to note that bees can be wintered well in this climate, either in the cellar or in the packing cases.

It is the intention to continue with the work in queen mating and possibly a start will be made in queen rearing. It is also the intention to increase the honey producing apiary as rapidly as possible by the division method until at least fifty colonies are in the yard.

EXPERIMENTAL PROJECTS UNDER WAY AT THE EXPERIMENTAL STATION, KAPUSKASING, ONT.

ANIMAL HUSBANDRY

Project No.	TITLE
	BEEF CATTLE
A. 356.	Sunflower vs. O. P. V. Silage for beef cattle.
A. 357	Sunflower vs. O. P. V. Silage for beef bred calves.
	DAIRY CATTLE
A. 56.	Cost of milk production.
A. 355.	Sunflower vs. O. P. V. Silage for milch cows.
A. 358.	Sunflower vs. O. P. V. for feeding dairy calves.
	SWINE
A. 120.	Self feeding vs. trough feeding.
A. 135.	Feeding corn vs. barley to hogs.
A. 146.	Feeding hogs vs. outside in summer.
A. 158.	Cost of maintaining brood sows.
A. 160.	Cost of rearing pigs to weaning age.
A. 168.	Skim-milk vs. tankage for pig feeding.
A. 230.	Ground oats vs. oat flour for pig feeding.
	HORSES
A. 331.	Cost of feeding work horses.
	SHEEP
A. 338.	Cost of feeding market lambs.
A. 418.	Sunflower vs. O. P. V. silage for lambs.

FIELD HUSBANDRY

	ROTATION EXPERIMENTS
F. 2.	Three-year rotation—sunflowers; oats; clover.
F. 27.	Five-year rotation—sunflowers; barley; clover; timothy; oats.
F. 37.	Five-year rotation—summer-fallow; fall wheat and fall rye; clover; timothy; oats.
F. 39.	Six-year rotation—potatoes; wheat; barley; clover; timothy; timothy.
	CULTURAL EXPERIMENTS
F. 53.	Dates of seeding grain crops.
F. 55.	Dates of seeding silage crops.
F. 60.	Rates of seeding silage crops.
F. 69.	Methods and cost of clearing land.
F. 70.	Breaking virgin soil.
F. 71.	Methods of surface drainage.
F. 72.	Tile-drained vs. undrained land.
	MANURE AND COMMERCIAL FERTILIZER EXPERIMENTS
F. 77.	Methods of applying manure.
F. 78.	Green manure crops.
F. 85.	Use of lime.
	FARM MANAGEMENT EXPERIMENTS
F. 88.	Yield and profit from root and silage crops.
F. 90.	Cost of operating tractor.
F. 91.	Cost of producing farm crops.

HORTICULTURE

	POMOLOGY
H. 4.	Currant, variety experiment.
H. 6.	Gooseberry, variety experiment.
H. 11.	Raspberry, variety experiment.

VEGETABLE GARDENING

PROJECT No.	TITLE
H. 61.	Bean, variety experiment.
H. 60.	Bean, broad, variety experiment.
H. 68.	Beet, variety experiment.
H. 69.	Borecole, or Kale, variety experiment.
H. 70.	Brussels Sprouts, variety experiment.
H. 77.	Cabbage, variety experiment.
H. 83.	Carrot, variety experiment.
H. 88.	Cauliflower, variety experiment.
H. 94.	Celery, variety experiment.
H. 102.	Corn, variety experiment.
H. 106.	Cucumber, variety experiment.
H. 108.	"Herbs," variety experiment.
H. 110.	Kohl-Rabi, variety experiment.
H. 116.	Lettuce, variety experiment.
H. 122.	Melon, musk, variety experiment.
H. 123.	Melon, water, variety experiment.
H. 138.	Onion, variety experiment.
H. 140.	Parsley, variety experiment.
H. 145.	Parsnip, variety experiment.
H. 154.	Pea, variety experiment.
H. 157.	Pepper, variety experiment.
H. 186.	Potato, variety experiment.
H. 188.	Pumpkin, variety experiment.
H. 192.	Radish, variety experiment.
H. 197.	Salsify, variety experiment.
H. 199.	Spinach, variety experiment.
H. 201.	Squash, variety experiment.
H. 211.	Tomato, variety experiment.
H. 214.	Turnip, variety experiment.

ORNAMENTAL GARDENING

H. 258.	Annuals, sown in hothouse or hotbed vs. sown in the open.
H. 261.	Annuals, variety experiment.
H. 270.	Freesia, variety experiment.
H. 275.	Hyacinths, variety experiment.
H. 278.	Narcissus, variety experiment.
H. 290.	Tulip, variety experiment.
H. 302.	Roses, variety experiment.

CEREALS

Ce. 1.	Common spring wheat: test of varieties or strains.
Ce. 4.	Winter wheat: test of varieties or strains.
Ce. 5.	Oats: test of varieties or strains.
Ce. 6.	Barley: test of varieties or strains.
Ce. 7.	Peas: test of varieties or strains.
Ce. 8.	Beans: test of varieties or strains.
Ce. 9.	Flax: test of varieties or strains.
Ce. 10.	Spring rye: test of varieties or strains.
Ce. 11.	Winter rye: test of varieties or strains.
Ce. 50.	Multiplication of cereals.

FORAGE PLANTS

Ag. 1.	Indian corn, variety tests for ensilage purposes.
Ag. 16.	Mangels, variety tests for yield and purity.
Ag. 36.	Carrots, variety tests for yield and purity.
Ag. 46.	Turnips, variety tests for yield and purity.
Ag. 47.	Turnips, early vs. late seeding.
Ag. 51.	Swedes, variety tests for yield and purity.
Ag. 76.	Sunflowers, variety tests for yield and purity.
Ag. 129.	Alfalfa, broadcast vs. rows for hay production.
Ag. 130.	Alfalfa, broadcast vs. rows for seed production.
Ag. 133.	Alfalfa, seeding with vs. without a nurse crop for seed production.
Ag. 146.	Red clover, variety tests for yield and general suitability.

FORAGE PLANTS—*Continued.*

Project No.	Title
Ag. 147.	Red clover, inoculation.
Ag. 148.	Red clover, rows vs. broadcast for seed production.
Ag 150.	Red clover, cutting at different dates for seed.
Ag. 151.	Red clover, seed growing vs. hay for profit. (Combination Ag. and F.).
Ag. 176.	Alsike clover, methods of seeding for seed production.
Ag. 202.	Timothy, seed production.
Ag. 231.	White dutch clover, variety tests for yield and suitability.
Ag. 241.	Annual hay crops, variety tests for yield and suitability. (B) Legume varieties, test for yield and suitability.
Ag. 258.	Hay and pasture mixtures experiments. (D) Hay and pasture mixtures experiments, red clover as a base. (E) Hay and pasture mixtures experiments, mixed clover as a base. (G) Hay and pasture mixtures experiments, grasses and clover alone and in combination.
Ag. 259.	Experimental methods.

POULTRY

P. 42.	Methods and rations for fattening and finishing roasters.
P. 47.	Milk substitutes for fattening.
P. 60.	Pullets vs. hens for egg production.
P. 82.	Skim-milk vs. beef-scrap.
P. 92.	Clover vs. sprouted oats.

APIARY

Ap. 7.	Wintering in cellar.
Ap. 8.	Wintering in 4-colony cases.
Ap. 13.	Controlled mating of queens.
Ap. 20.	Returns from apiaries.
Ap. 28.	Study of honey flows.
Ap. 30.	Outdoor vs. cellar wintering.

FIBRE PLANTS

E. 3.	Testing varieties of flax.
E. 4.	Testing varieties of hemp.
E. 7.	Seeding tests, sowing flax at different dates.

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