DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

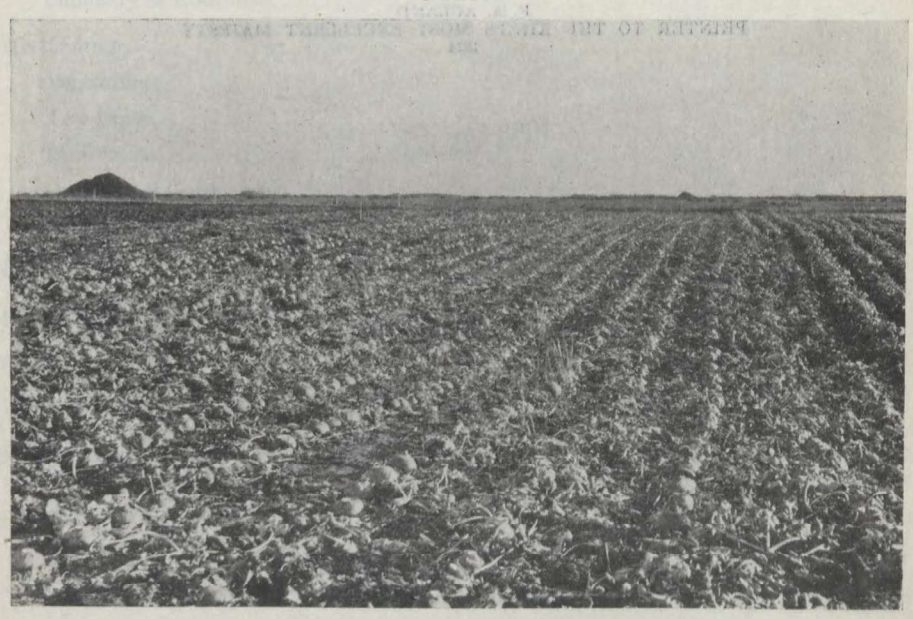
EXPERIMENTAL STATION

ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT

W. A. MUNRO, B.A., B.S.A.

FOR THE YEAR 1923



Five acres of Hall's Westbury swede turnips topped ready for lifting.

Printed by authority of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1924

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

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EXPERIMENTAL STATION, ROSTHERN, SASKATCHEWAN

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

SEASONAL NOTES

The winter of 1922-23 was remarkable for its mildness and for its light snowfall. A thaw in late February laid the ground bare in many places. This condition, coupled with the succeeding cold weather, adversely affected many biennials and perennials, and as a consequence any but the very hardy varieties of clovers, alfalfa, grasses and fall rye completely winter-killed, only those strawberries surviving which were mulched with straw.

Work on the land began on April 18 and was continued through May with almost no interruption from bad weather.

There was no frost after May till September 12. The absence of frost after May was very favourable for the setting of fruits of all kinds.

There was very little precipitation in May and early June. All grain seeded early came on well, but the dry weather of June hastened development and retarded growth in such a way that all early grains and all early-sown grains headed early, were short in the straw and the head, and yielded poorly. Added to this was the menace of such annual weeds as lamb's quarters and wild buckwheat which developed in the poor stand of grain. The late-sown grains yielded above the average, and were practically clear of weeds.

WEATHER OBSERVATIONS TAKEN AT ROSTHERN EXPERIMENTAL STATION, 1923

Month	Highest	Lowest	Mean	Precipitation 1923	Precipitation 13-year average 1911-1923	Sunshine
1923	Deg. F.	Deg. F.	Deg. F.	Inches	Inches	Hours
January	31·9	−32·2	−1·87	0·56	0·70	112·0
February	42·0	−39·9	−0·05	0·13	0·45	145·6
March	41·2	−27·8	10·24	0·56	0·85	169·4
April	75·9	− 3·8	36·68	0·66	0·81	253·5
May	84·2	21·9	51·42	1·05	1·63	348·3
June	91·2	41·0	61·89	3·59	2·14	251·0
July	86·9	40·1	65·17	3·52	2·79	317·0
August	80·0	40·0	59·50	2·67	1·80	284·6
September	80·9	21·0	52·13	1·15	1·63	227·2
October	72·0	10·1	42·20	0·23	0·63	212·0
November	59·4	− 5·0	27·50	0·19	0·56	108·1
December	43·2	−27·9	13·40	0·15	0·57	106·6
Total				14·46	14·56	2,535·3

Total precipitation for five growing months, April to August, 1923, 11·49 inches.
13-year average precipitation for five growing months, April to August, 1911-1923, 9·36 inches.

ANIMAL HUSBANDRY

HORSES

The draught horses at this Station number sixteen head, two pure-bred and seven grade mares, and seven grade geldings, all of Clydesdale breeding. In addition to these there is one light horse kept for driving and delivery work.

All of these horses have been kept in excellent working condition throughout the year. The feed at heavy work during the summer season consisted of western rye grass hay and whole oats, with one-third of the oat ration replaced by bran at night. When the horses are idle the grain ration is reduced one-half.

In winter the horses that are given moderate work daily are fed one-half a gallon of whole oats and bran each per day and as much western rye grass hay

as they will clean up; while the idle horses which are turned out into a large field for the day get the same ration but twice daily. Raw potatoes and carrots fed twice a week during the winter months adds variety to the ration and helps to keep the animals in a thrifty condition.

BEEF CATTLE

Beef cattle are not bred at the Station, but feeding steers are purchased in the autumn and sold in the spring. Following are some important deductions from these experiments:—

1. For seven of the past nine years the winter feeding of steers has shown a marked profit over all costs of feed, and this after allowing the outside market prices for feeds.
2. The market calls for finished steers of beef type. This, also, is the type which lays on flesh most economically. It is more profitable to pay considerably more for steers of desirable type.
3. By feeding largely home-grown feeds to cattle, and by using the manure on the land, the productivity of the farm is sustained.
4. Corn, sunflowers, and turnips are splendid succulent feeds. If properly cultivated they clean the land of weeds. Corn is more favourable for a succeeding crop of grain than are either of the other crops. Turnips are more expensive to grow, but they do not require expensive machinery for harvesting.

STEER-FEEDING EXPERIMENT

Sixty-six steers were purchased at Senlac, Sask., shipped to Rosthern, submitted to the tuberculin test, which they all passed, and on November 15 were delivered at the Experimental Station where those that had horns were dehorned and all were left in a feed-lot for a few days to settle.

The steers were divided into four lots. Lot 1 consisted of 18 two-year-olds. Lots 2, 3, and 4 were divided as nearly as possible equally, as determined by weight and quality. All lots were fed the same meal ration as calculated per weight of lot. The meal in all cases was ground oats at the beginning with a gradual introduction of ground barley until at the end it was all barley.

The value of the oat straw during the past season was not nearly so high as was the oat straw the year previously. The oat straw from the crop of 1921 carried a large amount of green undergrowth and green leaves, whereas, that of the crop of 1922 was very ripe and carried a small amount of leafage.

At the beginning, meal was fed at the rate of 1½ pounds per day per thousand pounds of steer and increased on December 12 to 6 pounds per day, and on January 12 to 10 pounds per day, and on February 17 to 11½ pounds per day which was continued till May 9.

Ensilage and turnips were fed at the rate of 8 pounds per day per thousand pound steer from the beginning till December 12 when it was increased to 30 pounds per day. On January 12 it was increased to 45 pounds per day and from February 17 to the end was 50 pounds per day.

Lots 1 and 2 were fed the same rations per weight of lots which consisted of meal, oat straw and sunflower ensilage.

Lot 3 was fed the same amount of meal and oat straw as lot 2 but was fed turnips instead of ensilage till March 15 when the turnips gave out and ensilage was substituted until the end of the feed period.

Lot 4 was not fed any succulent feed and although they made practically the same gains as lots 2 and 3 they were not in nearly the finished condition of those fed either turnips or ensilage.

All lots were fed hay from April 24 to the end of the experiment.

The steers were used in an experimental shipment to England and the price of 6¾ cents quoted is what they would have realized at Rosthern at the time they were shipped.

The cost of feed for the four lots is computed from the following table of prices:—

Meal	1 cent per pound
Hay	$ 8 00 per ton
Oat straw	2 00 "
Ensilage	3 00 "
Turnips	3 00 "

The price allowed for meal is close to the average market price throughout the winter. The price of hay (good prairie wool) is the price paid for it delivered to the corrals. The price for oat straw, ensilage and turnips are purely arbitrary, though they well cover the cost of production.

RATIONS FOR STEER FEEDING

		Sunflower ensilage	Sunflower ensilage	Turnips and silage	No succulence
		Lot 1	Lot 2	Lot 3	Lot 4
Number of steers in experiment		18	16	16	16
Initial weight, Nov. 25, 1922	lbs.	19,760	12,480	12,360	12,530
Average	"	1,098	780	772	783
Finished weight, May 9, 1923	"	25,680	17,940	17,420	17,490
Average	"	1,427	1,121	1,089	1,093
Total gain in 165 days	"	5,920	5,460	5,060	4,960
Average	"	329	341	316	310
Average daily gain per steer	"	2	2·06	1·92	1·87
Amount of meal eaten	"	28,940	20,142	20,142	20,142
Amount of Prairie hay eaten	"	5,030	4,470	4,470	45,990
Amount of oat straw eaten	"	46,980	41,760	41,760	.....
Amount of sunflower ensilage eaten	"	134,250	85,320	24,050	.....
Amount of turnips eaten	"	.....	.....	49,570	.....
Meal fed per pound of gain	"	4·88	3·68	3·98	4·06
Hay fed per pound of gain	"	0·85	0·82	0·88	9·27
Oat straw fed per pound of gain	"	7·94	7·65	8·25	.....
Ensilage fed per pound of gain	"	22·67	15·63	4·75	.....
Turnips fed per pound of gain	"	.....	.....	9·79	.....
Cost per 100 pounds gain	$	9 40	7 10	7 30	7 80
Gross cost of feed	$	557 87	389 04	372 16	385 38
Average cost of feed per steer	$	31 00	24 30	23 25	24 10
Total cost of steers	$	715 11	451 65	447 31	453 46
Total selling price at 6¾ cents per pound	$	1,733 40	1,210 95	1,175 85	1,180 56
Average buying price per steer	$	39 73	28 23	27 96	28 34
Average selling price per steer	$	96 30	75 68	73 49	73 78
Average increase in value	$	56 57	47 45	45 53	45 44
Profit over feed cost on group	$	460 42	370 26	356 38	341 72
Profit over feed cost per head	$	25 58	23 14	22 27	21 36

The table shows practically no difference between the turnip-fed lot and the ensilage-fed lot. As a matter of fact, those fed turnips did not carry nearly the finish of those fed ensilage up to the time turnips were finished. However, they seemed to make up for it from March 15 to May 9 when fed ensilage, because at the end there was no noticeable difference between the lots.

DAIRY CATTLE

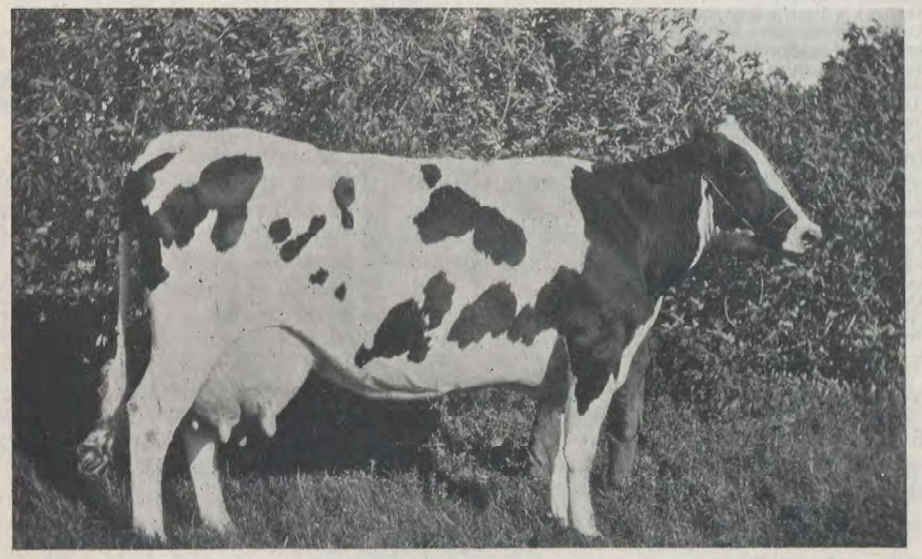
The dairy cattle on this Station are of the Holstein-Friesian breed and are all pure-bred. The herd numbers twenty-seven head made up as follows: One three-year-old herd bull, fourteen cows, four two-year-old heifers, four yearlings, and four young bulls. With the exception of the herd sire and one foundation cow, all of the above number have been bred and developed at this Station.

Good progress has been made with the herd during the past year. Six cows completed 365 day R.O.P. records, averaging 14,421 pounds milk and 661 pounds of butter. At the present time ten cows and heifers are on test. The heifers in the herd as well as all possible cows are entered in the Record of Performance as soon as they freshen. The young stock have been thrifty and have developed well. Five young bulls were sold into various localities in Saskatchewan, and as they are all from good milking stock, they should be instrumental in raising the

standard of the dairy herds in the districts to which they were sent. They are free from tuberculosis, having undergone five tests without a reactor.

From the start in dairy cattle in 1914 when two heifer calves from stock of no outstanding merit as producers were purchased, the object has been to increase the standard of the herd through breeding to a bred-for-production sire. Breeding operations have been carried on long enough to test the system used.

The present herd sire, Agassiz Sir Pietje No. 51064, is a three-year-old bull weighing 2,000 pounds in light flesh. Combined with size, he has good depth of middle, strength of top and dairy type with good breeding back of him. His dam has a record of 15,556 pounds of milk and 681 pounds of butter. Four daughters of this cow have already qualified, one of which has a four-year-old record of 19,935 pounds milk and 933 pounds butter, and another a three-year-old record of 18,731 pounds milk and 825 pounds butter—the best three-year-old in Canada that year. The sire of this cow has 32 tested daughters. On his sire's side the bull traces back to the Century Sire, De Kol 2nd's Butter Boy 3rd, who has to his credit 119 tested daughters. As the offspring of Agassiz Sir Pietje are but calves, little can be said of his ability to transmit these high producing qualities but as this bull represents better breeding than the average of the herd, it is expected that he will make an improvement as have the other bulls used, in both milk and butter fat. His young stock are giving every indication of developing into individuals which will be a credit to the herd.



Bonnieview Gypsy Keyes—One of the two foundation cows of the herd, with a record of 13,913 pounds of milk, and whose three-year-old daughter produced 18,535 pounds of milk in a year.

The meal ration fed the cows consisted of 400 pounds oat chop, 200 pounds bran, 200 pounds oil meal and 150 pounds barley chop. This meal was fed on the basis of one pound of meal to each three and one-half pounds of milk produced by the cow.

In the winter, the roughage consisted of corn silage, sunflower silage, swede turnips and western rye grass hay. The amount of roughage fed each cow daily was 50 pounds silage, 30 pounds of sliced turnips and 10 pounds of hay. In the spring, when the grass was well started, the cows were turned out to pasture. No roughage was fed during the spring and summer months. In the fall, to supplement the dry pasture, the soiling system was practiced to a limited extent.

Cow Number	No. of Lactation Period	No. of days in Milk	Total pounds of Milk for Period	Daily average Yield of Milk	Average per cent Fat in Milk	Pounds of Fat for Period	Pounds Butter for Period	Amount of Meal eaten at 1c. per lb.	Amount of Roots and Ensilage eaten at $5 per ton	Amount of Hay eaten at $10 per ton	Amount of Straw eaten at 20c. per cwt.	Months on Pasture at $1.50 per month	Total cost of Feed for Period	Total value of Product at 1½c.	Profit on Product	Cost to Produce 100 lbs. Milk
			Lbs.	Lbs.	%	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Months	$	$	$	$
81	1	375	14,935	39·9	3·46	516	645·0	4,214	16,590	3,207	2,435	4·5	111 28	224 02	112 74	0 75
89	5	339	14,079	41·6	3·72	523	653·7	4,075	14,230	2,557	2,035	4·2	99 47	211 18	111 71	0 70
77	2	354	12,820	36·2	3·67	470	587·5	3,920	17,890	2,742	2,175	4·3	108 43	192 30	83 87	0 84
79	1	413	12,385	30·0	3·37	417	521·2	3,326	17,730	3,457	2,185	5·0	106 73	185 77	79 04	0 86
80	2	305	12,336	40·4	3·87	478	597·5	3,696	14,880	2,772	1,845	3·9	97 56	185 04	87 48	0 79
78	4	302	10,196	33·8	4·37	445	556·2	2,968	17,700	3,588	2,315	3·3	101 45	152 94	51 49	0 99

SHEEP

On December 31, 1923, the flock consisted of thirty-eight breeding ewes, twelve spring lambs, and two pure-bred Leicester rams. The ewes are grades and conform somewhat to the Leicester type, except that they are deeper-bodied and have finer and closer wool. During the season of 1923, the thirty-four breeding ewes dropped and raised to marketable age, forty-four lambs, or 129.4 per cent. The 1923 wool-clip was 52 fleeces, 488.5 pounds, or an average of 9.4 pounds per fleece. Towards the end of the calendar year, nine mature ewes, totalling 1,445 pounds live weight, and thirty-two spring lambs, totalling 2,730 pounds live weight, were sold.

The housing facilities of the flock any farmer desiring to raise sheep could duplicate. From the first of December until the middle of May the sheep have the run of a yard enclosed with woven wire. A frame building cheaply but strongly constructed with one-ply lumber, 40 feet long, 20 feet wide and 6 feet high, covered with poles and straw, affords winter shelter. As a precaution against injury to the ewes the doors of the shelter are 5 feet wide. After lambing time in the spring the ewes and lambs are turned out into a large pasture with access to water, and left for the rest of the summer. On September 1, after threshing, the flock is allowed the run of the stubble and root fields. When the cold weather sets in they are brought up to the buildings.

The work of grading up the flock has been under way for eight years. The object in view with the grade flock was to demonstrate the value of using a pure-bred sire on the average grade ewe.

GRADING-UP EXPERIMENT

In the fall of 1915, one hundred range-bred ewes showing a mixture of breeding were purchased as a foundation for a grade breeding-flock to be used in a grading-up experiment. These ewes were bred to a good pure-bred Leicester Ram, and in turn the offspring have been consistantly bred to other good type pure-bred rams of the same breed. The practice at this Station has been to cull out the least desirable ewes from year to year and to keep the remainder for breeding. In the fall of 1920 the last of the original ewes were disposed of, and in 1922 the breeding flock of Leicester grades exhibited uniformity in size and type. In addition to selecting the breeding ewes which possess a combination of type, scale, and quality to the greaest degree, a great deal of attention was given to the quality and weight of the fleece, especially to the covering on the underside of the body and to compactness over the back, with the result that the flock now possess a finer and closer wool than does the typical pure-bred Leicester. The wool clip in 1916 averaged eight pounds per sheep; in 1920 the average per sheep was nine and two-tenths pounds; while in 1923 the average was nine and four-tenths pounds. In 1923 the mature ewes averaged 170 pounds each.

The product of the first, and more so that of the second cross, showed improvement in mutton characteristics over the original ewes; but it was the third cross that showed the most pronounced improvement in size, weight of wool, suitability of type and quality. They were more uniform, fuller in quarters and brisket and with a more even covering of flesh than was the foundation flock. This improvement is due in a large measure to the breeding and quality in the pure-bred Leicester rams used.

What has been accomplished by the use of good pure-bred Leicester rams at this Station has been duplicated by many practical sheep-raisers throughout the

West with not only the Leicester sire, but with pure-bred sires of any of the long-wooled or Down breeds. The farmer with an average grade flock will be well repaid by the purchase of a good pure-bred sire to head his flock.

SWINE

Berkshire, Tamworth and Yorkshire swine are now maintained at this Station. The Berkshire herd consists of fourteen brood sows and two boars; the Tamworth of nine sows and two boars. The start in Yorkshires was made in the fall of 1923 when two pure-bred gilts, one pure-bred boar, and four grade gilts were purchased for the purpose of carrying on a further comparison of breed tests in subsequent years and with a view to determining the value of cross-breeding for the production of market hogs. Twenty-seven sows have been bred to boars of the above-mentioned breeds, and next year it is proposed to conduct feeding tests comparing pure-bred Berkshires, Tamworths, and Yorkshires with Berkshires-Tamworth, Berkshire-Yorkshire, Tamworth-Berkshire, Tamworth-Yorkshire, Yorkshire-Berkshire and Yorkshire-Tamworth crosses.

Satisfactory progress has been made during the year. From twelve brood-sows seventy-six pigs were raised to marketable age. Seven Berkshire sows gave an average of 7.7 pigs per litter and raised an average of 6.6. Five Tamworth sows gave an average of 8.6 pigs per litter and raised 5.8 pigs. Four of the sows gave litters in the autumn totalling thirty-eight pigs, thirty-six of which were raised and with which an experiment was started to ascertain whether fall pigs can be raised at a profit, and to compare tankage, skim-milk and ground flax as supplements to a check ration consisting of oat chop and shorts with the addition of barley chop towards the end of the finishing period.

In the winter the sows were given the run of a large open yard for exercise with a straw stack for shelter and a week after the spring litters were weaned were carried through the summer on pasture with access to water. No meal was fed while on pasture.

Three feeding experiments were conducted during the past season with five objects in view, viz., a comparison of light and heavy meal feeding as it affected gains and quality of carcass, a comparison of breeds, a comparison of pastures, and a comparison of self-feeder and hand-feeding.

The results are not conclusive beacuse they are derived from only one years trial. In the breed experiments, particular strains may have influenced the results.

LIGHT AND HEAVY FEEDING OF PASTURE AND DRY LOT

How Experiment was Conducted.—The pure-bred Berkshire, Tamworth, and the progeny obtained from crossing these two breeds were selected for this experiment. Forty-two pigs having the above breeds and cross-breds as equally represented as possible were divided into six lots as follows:—

Lot 1—Heavy hand-feeding on oat pasture.
Lot 2—Light hand-feeding on oat pasture.
Lot 3—Heavy hand-feeding on rape pasture.
Lot 4—Light hand-feeding on rape pasture.
Lot 5—Heavy hand-feeding in dry lot.
Lot 6—Light hand-feeding in dry lot.

The pigs were of litters farrowed between April 3 and May 11 inclusive and in making the allotment an even distribution was made with regard to age,

weight, sex and general thrift. The handling of the pigs previous to the beginning of the test had been practically the same. As the fundamental idea was to promote growth rather than finish, the ration to begin with consisted of equal parts, by weight, of hulless oats and shorts.

The hulless oat chop was gradually replaced with unhulled oat chop and the shorts with barley chop. Toward the finishing period, the percentage of barley chop was increased and finally made up two-thirds of the ration. In order that the ration could be calculated according to a standard of heavy feeding per one hundred pounds live weight, individual weights of pigs were taken at the commencement of the test and each fourteenth day during the test. For the first month of the experiment, five pounds of meal mixture per day was fed for every hundred pounds of live weight. As the pigs increased in weight, the amount was decreased and throughout the finishing period, four pounds per hundred pounds live weight apparently formed a satisfactory basis. The light feeding for the pigs on pasture was one-half, and in the dry lot, two-thirds that of heavy feeding. Owing to the pastures becoming exhausted three months after the commencement of the test, the ration for each lot receiving light feed was increased, and all lots shared equally per hundred pounds live weight. One month previous to marketing, the hogs were finished off in the piggery. Lots 1 and 3 receiving heavy feed on oat and rape pasture had the run of three-fourths of an acre, and lots 2 and 4 receiving light feed on oat and rape pasture, had access to one and one-half acres. Lot 5 receiving heavy feed was confined to a yard 80 feet by 40 feet, and lot 6 receiving light feed was given the run of a yard 80 feet by 16 feet.

A grove of caragana afforded a satisfactory shade for lots on pasture. The feed was given three times daily to all as a thick slop. Each group had access to a constant supply of fresh water and to a mineral mixture of lime, bone meal and salt. As the pigs reached a weight ranging between 175 and 215 pounds live weight, which is a desirable size for a bacon hog, they were marketed and graded.

Deductions.—In comparing lots 1, 3 and 5 we find the results to show very little difference, either in respect to cost per pound of gain or to daily gains made. In both comparisons the meal required per pound gain and the cost per pound of gain are remarkably even.

One factor which is well worthy of note in this experiment is the value of pasture crops in pork production. On the average, the pigs on pasture required 36.3 pounds less meal for each one hundred pounds gain than those fed in dry lot, which means it cost 36.3 cents more per 100 pounds gain to feed inside. Furthermore, the pigs on heavy hand-feeding on pasture were ready for market at six and one-half months of age, weighing over one hundred and seventy pounds on the average, while those on heavy hand-feeding in dry lot weighed only one hundred and forty-five pounds, on the average, and were not up to market weight until a month later. It is noteworthy, also, that the lots on light hand-feeding on pasture made slightly greater daily gains on 96.5 pounds less concentrates per 100 pounds gain than those on heavy hand-feeding in the dry lot.

The outstanding factor in this experiment is the economy of gains which it is possible to make with pigs on pasture when care is exercised in the feeding and in the choice and combination of the feeds. It will be noted from the results as found in the accompanying table that lots 1 and 3 made slightly greater daily gains than lots 2 and 4; but these were made at a considerable cost. Taking an average, it cost 86·5 cents more per 100 pounds of gain when heavy fed or 84·5 pounds more of meal per 100 pounds of gain. The figures

serve to demonstrate the material saving that seems possible when limited feeding is practised with pigs on pasture.

When the average daily gains made by lots 1 and 2, 3 and 4 are compared we find that the possibility of making good daily gains is not reduced to any appreciable extent by the limited feeding of concentrates. It was observed throughout the experiment that the limited-fed pigs on pasture took more exercise and apparently helped themselves to more of the green forage.

In comparing heavy hand-feeding with light hand-feeding in dry lot we find that lot 5 averaged 0·1 pound higher daily gains than lot 6; but these were made at 0·37 cents a pound higher cost. This is not in accordance with the popular belief that when pigs are not on pasture, the more rapidly they can be made to gain by supplying them with an abundance of feed, the cheaper will be their gains. The more economical gains made by lot 6 may, in part, at least be attributed to the fact that at the completion of the experiment, the limited-fed hogs were on the average 11 pounds lighter in weight than the heavy-fed hogs. The results of this dry lot comparison would indicate that hogs must be supplied with enough concentrates to keep them in a thrifty condition throughout the growing period if they are to be marketed at 6½ months to 7 months of age.

COMPARISON OF LIGHT AND HEAVY FEEDING FOR PIGS ON PASTURE AND IN DRY LOT

——		Lot 1 Heavy feeding oat pasture	Lot 2 Light feeding oat pasture	Lot 3 Heavy feeding rape pasture	Lot 4 Light feeding rape pasture	Lot 5 Heavy feeding dry lot	Lot 6 Light feeding dry lot
Number of hogs in experiment		7	7	7	7	7	7
Initial weight, gross	lbs.	328	310	310	291	290	315
Initial weight, average	"	46·8	44·2	44·2	41·5	44·4	45·0
Finished weight, gross	"	1,354·0	1,265·0	1,309·0	1,260·0	1,216·0	1,137·0
Finished weight, average	"	193·4	180·7	187·0	180·0	173·7	162·4
Number of days in experiment		156·0	156·0	156·0	156·0	156·0	156·0
Total gain for period	lbs.	1,026·0	955·0	999·0	969·0	926·0	822·0
Average gain per animal for period	"	146·6	136·4	142·7	138·4	132·3	117·4
Average daily gain per animal	"	0·94	0·87	0·92	0·88	0·85	0·75
Amount of meal eaten by group	"	4,277·3	3,134·3	4,095·7	3,189·9	3,937·8	3,197·1
Amount of meal eaten per pound gain	"	4·17	3·28	4·09	3·29	4·25	3·89
Total cost of feed	$	42·88	31·32	41·08	31·78	39·47	32·00
Cost of feed per head	$	6·13	4·47	5·87	4·54	5·64	4·57
Feed cost per head per day	cts.	3·93	2·87	3·76	2·91	3·62	2·93
Cost to produce one pound gain	"	4·18	3·28	4·11	3·28	4·26	3·89

Cost of feeds—

Oats, 35 cents per bushel; Barley, 45 cents per bushel; Shorts, $21 per ton.

PASTURE AND HEAVY AND LIGHT FEEDING WITH PURE-BRED AND CROSS-BRED HOGS

Procedure.—To determine the effect on the carcass of the finished hog of heavy versus light feeding on both oat and rape pasture vs. heavy and light feeding in dry lot, and also to compare Berkshires, Tamworths and their crosses, the same pigs were used as in the last described experiment and recorded in the last table. There were pure-bred Berkshires, pure-bred Tamworths, crosses between Tamworth boar and Berkshire sows and crosses between Berkshire boar and Tamworth sows. Representatives of each were fed heavy and light meal rations on oat pasture, rape pasture and dry lot. The accompanying table gives the details of breed, feed, gains and sales returns:—

HEAVY AND LIGHT FEEDING WITH AND WITHOUT PASTURE ON PURE-BRED AND CROSS-BRED HOGS

Lot	Breed	Type of pasture	Weight on July 18, 1923	Marketed		Grade	Sales returns
				Weight	Date		
			lbs.	lbs.			$ cts.
1	T.B.C.	Heavy feeding on oat pasture.	63·0	218	Nov. 19	Thick smooth	14 72
	B.T.C.		51·5	206	" 19	Select	15 29
	B.T.C.		50·0	193	" 19	Select	14 33
	Berk.		53·0	176	" 19	Select	13 07
	Berk.		42·0	206	Dec. 10	Thick smooth	12 87
	Tam.		23·0	195	" 24	Thick smooth	12 19
	Tam.		45·5	160	" 10	Thick smooth	10 00
2	T.B.C.	Light feeding on oat pasture.	62·0	219	Nov. 19	Select	16 26
	B.T.C.		40·5	187	" 19	Select	13 88
	B.T.C.		44·0	190	Dec. 10	Thick smooth	11 88
	Berk.		45·0	200	" 10	Thick smooth	12 50
	Berk.		52·0	167	" 10	Thick smooth	10 44
	Tam.		33·0	154	" 10	Select	10 48
	Tam.		33·5	148	" 10	Select	10 17
3	T.B.C.	Heavy feeding on rape pasture.	56·0	202	Nov. 19	Thick smooth	13 64
	B.T.C.		45·0	180	" 19	Select	13 36
	B.T.C.		42·0	185	" 19	Thick smooth	12 49
	Berk.		38·0	209	Dec. 10	Thick smooth	13 06
	Berk.		41·0	203	" 10	Thick smooth	12 69
	Berk.		47·0	177	" 10	Thick smooth	11 06
	Tam.		41·0	153	" 10	Thick smooth	9 56
4	T.B.C.	Light feeding on rape pasture.	69·0	215	Nov. 19	Thick smooth	14 51
	B.T.C.		53·0	195	" 19	Select	14 48
	B.T.C.		43·0	193	Dec. 10	Thick smooth	12 06
	Berk.		37·0	173	" 24	Thick smooth	10 81
	Berk.		27·0	172	" 24	Thick smooth	10 75
	Berk.		31·0	152	" 24	Thick smooth	9 50
	Tam.		31·0	160	" 24	Select	11 00
5	T.B.C.	Heavy feeding on dry lot.	60·0	178	Nov. 19	Thick smooth	12 02
	B.T.C.		48·0	195	Dec. 10	Thick smooth	12 19
	B.T.C.		31·0	185	" 24	Thick smooth	11 56
	B.T.C.		24·0	170	" 24	Thick smooth	10 62
	Berk.		46·0	173	" 3	Thick smooth	10 81
	Berk.		51·0	163	" 3	Thick smooth	10 19
	Tam.		30·0	152	" 24	Thick smooth	9 50
6	T.B.C.	Light feeding in dry lot.	62·0	190	Dec. 10	Thick smooth	11 88
	B.T.C.		46·0	177	" 10	Thick smooth	11 06
	B.T.C.		37·0	170	" 24	Select	11 68
	Berk.		53·0	170	" 24	Thick smooth	10 62
	Berk.		33·0	135	" 24	Thick smooth	8 44
	Berk.		48·0	150	" 10	Thick smooth	9 38
	Tam.		36·0	145	" 10	Thick smooth	9 06

T.—Tamworth
B.—Berkshire.
C.—Cross.

Deductions.—An examination of this table reveals certain definite results:—

1. That most of the selects were on oat pasture and of these the most were on limited meal ration.

2. Of the eleven which graded select, seven were cross-breds, three were Tamworths and one was Berkshire.

3. Of the thick smooths, fourteen were Berkshires, twelve were cross-breds and five were Tamworths.

4. That pasture aids materially in the production of the bacon hog.

5. That by the use of proper feeds and feeding methods, the desired type of bacon hog can be produced economically from a Berkshire boar, Tamworth sow cross or a Tamworth boar, Berkshire sow cross, providing care is exercised in the selection of the foundation stock.

The observations throughout the feeding period were quite in accord with the results in the table. A point indicated in the table is the uneveness of maturity. Of the lots on pasture, the cross-breds and one Berkshire were ready for market before the other Berkshires or any of the Tamworths.

The lots without pasture were slow in maturing, some not being up to market weight at eight months.

The lot on oat pasture with limited meal ration was trimmer in appearance throughout the period; whereas, both lots on rape pasture developed heavy middles.

The cross-bred hogs in each lot were the more aggressive and vigorous and consequently appeared to consume a major portion of the ration at the expense of the weaker hogs, which may account in part, for the apparent economy of gains made by them in comparison with the Berkshires and Tamworths.

The experiment should be repeated several times before definite conclusions are drawn as differences of strain and individualtiy within the breeds might influence the results another year. Neverthless the results are significant.

PASTURE CROPS AND BREED COMPARISON

In this experiment a comparison of rape and oats for pasture for hogs was made and the relative efficiency of Berkshire and Tamworth as economical pork producers ascertained.

Methods Followed.—Six uniform young boars of each of the above breeds were selected for the test. Three boars of each breed were pastured on rape and the same number on oats. At two week intervals, each lot was weighed, and the ration for the next two weeks was based on these weights. The ration consisted of oats, barley and shorts fed three times daily in the form of a slop. The pigs had free acess to water, and a mixture of lime, bone meal, and salt.

PASTURE CROPS AND BREED COMPARISON

		Berkshire		Tamworth	
		Rape	Oat	Rape	Oat
Number of hogs in experiment		3	3	3	3
Initial weight, gross	lbs.	129·0	145·0	97·0	123·0
Initial weight, average	"	43·0	48·3	32·3	41·0
Finished weight, gross	"	511·0	565·0	398·0	437·0
Finished weight, average	"	170·3	188·3	132·7	145·7
Number of days in experiment		110·0	110·0	110·0	110·0
Total gains for period	lbs.	382·0	420·0	301·0	314·0
Average gain per animal for period	"	127·3	140·0	100·3	104·7
Average daily gain per animal	"	1·16	1·27	0·912	0·952
Amount of meal eaten by group	"	1,153·0	1,339·0	1,153·0	1,339·0
Amount of meal eaten per pound gain	"	3·02	3·19	3·83	4·26
Total cost of feed	$	11 62	13 50	11 62	13 50
Cost of feed per head	$	3 87	4 50	3 87	4 50
Cost of feed per head per day	cts.	3·52	4·09	3·52	4·09
Cost to produce 1 pound gain	"	3·04	3·21	3·86	4·29

Cost of feeds—
Oats, 35 cents per bushel; Barley, 45 cents per bushel; Shorts, $21 per ton.

Deductions.—This experiment shows oat pasture to make the most rapid gains and rape pasture to make the most economical gains. Owing to the fact that the rape pasture extended for a longer period may partially account for the 30 pounds more concentrates required per 100 pounds gain by the hogs on oat pasture. The oat-pastured hogs consumed more meal which accounts, in part at least, for the average of 0·15 pounds higher daily gains.

It is noteworthy that the results of this experiment represents but one year's trial and therefore does not prove the superiority of one pasture or the

superiority of one breed, as different feeding and climatic conditions as well as strains within a breed and individuals of that strain might influence the results obtained.

SELF-FEEDER VERSUS HAND-FEEDING

In this experiment one lot of 11 pigs confined to a corral without pasture had access to shorts, oats and barley chop in a self-feeder and another lot of 11 pigs were hand-fed a ration of the same feeds in the form of a slop, being given all they would clean up three times a day. They all had access to a mixture of lime, bone meal and salt and in addition received all the water they would drink.

SELF-FEEDER VERSUS HAND-FEEDING

		Self-feeder	Hand-feeding
Number of hogs in each lot		11	11
First weight, gross	lbs.	580·0	590·0
First weight, average	"	52·7	53·6
Final weight, gross	"	1,894·0	1,470·0
Final weight, average	"	172·2	133·6
Number of days in experiment		93·0	93·0
Total gain for period	lbs.	1,314·0	880·0
Average gain per animal	"	119·5	80·0
Average daily gain per animal	"	1·17	0·784
Pounds of feed consumed	"	6,681·0	5,812·0
Pounds meal eaten per pound gain	"	5·08	6·60
Total cost of feed	$	67·63	58·99
Cost of feed per animal	$	6·15	5·36
Cost of feed per animal per day	cts.	6·60	5·76
Cost to produce 1 pound gain	"	5·15	6·70

Cost of feed—
Oats, 35 cents per bushel; Barley, 45 cents per bushel; Shorts, $21 per ton.

Deductions.—The hogs on the self-feeder consumed more feed, made greater daily gains and produced gains at a cost of 1·6 cents less per pound than the hand-fed hogs. Had the cost of labour been calculated in this experiment the results would have shown a still greater advantage in favour of the self-feeder.

It was observed that the self-fed lot became fat and were less active than the hand-fed lot. Although all pigs in both lots at the finish graded thick smooth, those that were hand-fed more nearly approached the desirable bacon type. This is probably due to the fact that the self-fed pigs helped themselves many times during the day thus being "full fed" at all times.

This would seem to indicate that the self-feeder should not be used for growing the bacon hog or for feeding pure-bred breeding animals; but may be used to advantage when rapid gains are wanted towards the end of the fattening period.

FIELD HUSBANDRY

The season of 1923 was very unusual in many respects. Following a winter of light snowfall, the weather remained dry until the middle of June. From June until early fall there was an abundance of moisture for all crops, followed by dry weather which was ideal for threshing. Outside of this immediate locality sufficient rain fell in May, so that in this district as a whole, conditions for grain were almost ideal.

The wheat crop, with the exception of that on rotation "P" was below average. This was largely due to excessive weed growth. The dry spring gave the lamb's quarters a chance to get well rooted before the grain made

much growth, and with the advent of moisture in June, the weeds surpassed the grain. Rust also damaged the later wheat to some extent.

Oats and barley in nearly all cases were above average, though they were also badly infested with weeds. Being sown later, they received rainfall in time to outgrow the weeds to some extent.

The root crop was the best that has ever been grown since this Station was started in 1909. One 2½-acre field of turnips yielded over 27 tons per acre; while another yielded over 26 tons.

The dry weather in early fall proved detrimental to the sunflowers. Though they made a very good growth during the summer, they withered and were nearly dead when cut the first week in September. Based on absolute dry matter, the yields this year may have been above average; but on green matter, they were very low.

Corn stood the dry fall much better than the sunflowers, and yielded well in green weight, though the dry matter content was lower than that of sun-flowers.

The dry spring at one time threatened to make the tame hay crop a total failure but with plenty of rain in late June, it revived, and though not cut until late July made a yield above average. The second crop of hay after seeding down gave a better yield that the first. The second crop, in this case, which was sown in 1921 was sown through the drill mixed with the nurse crop, while the first crop sown in 1922 was sown broadcast after the nurse crop. The second crop was thinner than the first, and thus may have withstood the dry weather better early in the season.

Following is a table showing the yields of sunflowers and corn from the different rotations when cut and when ensiled. In most cases they lay on the ground about a week after cutting before being put into the silo. The difference, therefore, is due to evaporation and was greater where the sunflowers were cut in a greener condition.

CORN AND SUNFLOWER YIELDS

Rotation	Crop	Yield per acre	
		When cut	When ensiled
		tons	tons
J. 2	Corn	8·45	8·07
J. 2	Sunflowers	6·43	5·93
P	Sunflowers	9·71	9·15
R	Sunflowers	11·03	9·33
5-year	Sunflowers	8·58	7·20

PRODUCTION COSTS

The following tables give the cost of producing different crops on each rotation, showing in detail where the expense is incurred:

COST AND RETURN VALUES, 1923

STATEMENT OF RETURN VALUES

Wheat	per bush.	$ 0 80
Barley	"	0 40
Oats	"	0 30
Western rye grass hay	per ton	9 00
Oat and barley straw	"	2 00
Sunflowers	"	3 00
Corn	"	3 00
Turnips	"	1 50

STATEMENT OF COST VALUES

Rent	per acre	$ 3 00
Barnyard manure	per ton	1 00
Seed wheat	per bush.	1 00
Seed oats	"	0 75
Seed barley	"	0 90
Seed turnips	per lb.	1 00
Seed sunflowers	"	0 15
Seed western rye grass	"	0 07
Seed corn	"	0 03
Machinery	per acre	1 00
Horse labour, per horse	per hour	0 10
Manual labour	"	0 25
Threshing—wheat	per bush.	0 13
oats	"	0 10
barley	"	0 11
Twine	per lb.	0·145

COST OF GROWING HAY

—	Rotation R.—Following hay	Rotation R.—Following oats	Rotation 5-year—Following barley	Rotation P.—Following hay	Rotation P.—Following barley	Rotation J. 2—Following hay	Rotation J. 2—Following oats
Area in acres	5	5	5	5	5	5	5
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ c-s.	$ cts.
Rent	15 00	15 00	15 00	15 00	15 00	15 00	15 00
Manure	10 71	10 71	15 00	12 50	12 50	.....	.....
Machinery	5 00	5 00	5 00	5 00	5 00	5 00	5 00
Seed	3 50	3 50	8 75	3 50	3 50	3 50	3 50
Seeding	0 75	0 75	1 50	0 75	0 75	0 75	0 75
Harrowing	0 81	0 81	1 30	0 81	0 81	0 81	0 81
Mowing	1 58	1 58	1 57	1 58	1 58	1 58	1 58
Raking	1 35	1 35	1 35	1 35	1 35	1 35	1 35
Hauling	4 20	3 50	4 20	4 90	4 55	4 20	3 15
Total cost	42 90	42 20	53 67	45 39	45 04	32 19	31 14
Cost per acre	8 58	8 44	10 73	9 08	9 01	6 44	6 23
Yield per acre—tons	1 22	1 08	1 16	1 42	1 35	1 24	0 93
Value per acre at $9 per ton	10 98	9 72	10 44	12 78	12 15	11 16	8 37
Cost per ton	7 03	7 81	9 25	6 39	6 67	5 18	6 70
Profit or loss per acre	2 40	1 28	— 29	3 70	3 14	4 72	2 14

NOTE.—The loss on the five-year rotation in hay following barley is due to the fact that in this rotation there is only one crop of hay taken off before the sod is broken for sunflowers, and the whole cost of seeding is, therefore, charged against one crop of hay instead of two crops as in the other rotations.

COST OF GROWING OATS AND BARLEY

——	Oats					Barley		
	Rotation J.—Following wheat	Rotation 5-year—Following wheat	Rotation J. 2—Following wheat	Rotation R.—Following wheat	Rotation R.—Following wheat	Rotation 5 year—Following oats	Rotation P.—Following turnips	Rotation P.—Following sunflowers
Area in acres	12·0	5·0	5·0	5·0	5·0	5·0	2·5	2·5
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Rent	36 00	15 00	15 00	15 00	15 00	15 00	7 50	7 50
Machinery	12 00	5 00	5 00	5 00	5 00	5 00	2 50	2 50
Manure	.....	15 00	.....	10 72	10 72	15 00	6 25	6 25
Ploughing	17 55	7 15	7 15	7 15	7 15	7 15	3 57	3 57
Packing	4 55	3 90	1 95	1 95	1 95	3 57	0 98	0 98
Harrowing	.....	1 95	1 62	1 62	1 62	1 30	0 82	0 82
Seed	18 00	7 50	7 50	7 50	7 50	9 00	4 50	4 50
Seeding	3 25	1 62	1 62	1 62	1 63	1 63	0 81	0 81
Cutting	4 55	1 95	2 28	3 25	1 95	1 95	1 13	1 13
Stooking	3 50	1 50	1 50	2 50	1 50	1 50	0 75	0 75
Twine	7 39	2 90	2 46	3 04	1 16	2 17	1 38	1 13
Threshing	54 60	28 70	26 80	25 50	27 90	22 22	13 42	11 44
Total cost	161 39	92 17	72 88	84 85	83 08	85 49	43 61	41 38
Cost per acre	13 45	18 43	14 58	16 97	16 62	17 10	17 44	16 55
Yield per acre—bushels	45 50	57 40	53 60	51 00	55 80	40 40	48 80	41 60
Yield per acre—straw in tons	1 53	1 40	1 19	1 46	0 56	0 99	1 24	1 00
Value per acre at 30c. (oats), 40c. (barley), and $2 (straw)	16 71	20 02	18 45	18 23	17 86	18 14	22 00	18 64
Cost per bushel, allowing $2 per ton for straw	0·228	0·272	0·227	0·274	0·278	0·374	0·306	0·35
Profit per acre	3 26	1 59	3 87	1 26	1 24	1 04	4 56	2 09

COST OF GROWING TURNIPS

——	Rotation P—Following fallow	Rotation R—Following fallow
Area in acres	2·5	2·5
	$ cts.	$ cts.
Rent	7 50	7 50
Machinery	2 50	2 50
Manure	6 25	5 36
Cultivating	0 97	.....
Packing	.....	0 97
Harrowing	.....	0 81
Seed	7 00	8 00
Seeding	1 35	1 35
Scuffling	0 90	1 12
Hoeing	27 50	18 12
Topping	4 25	4 00
Digging	1 57	1 57
Hauling	27 00	28 12
Cost of summer-fallow	17 80	23 32
Total cost	104 59	102 74
Cost per acre	41 84	41 10
Yield per acre in tons	26 15	27 70
Value per acre at $1.50 per ton	39 22	41 55
Cost per ton	1 60	1 48
Profit or loss (−) per acre	−2 62	0 45

COST OF GROWING SUNFLOWERS AND CORN

	Rotation J. 2—Corn following wheat	Rotation R.—Sunflowers following fallow	Rotation P.—Sunflowers following fallow	Rotation 5-year—Sunflowers following barley	Rotation J. 2—Sunflowers following wheat
Area in Acres	2·5	2·5	2·5	5·0	2·5
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Rent	7·50	7 50	7 50	15 00	7 50
Machinery	2 50	2 50	2 50	5 00	2 50
Manure	.....	5 36	6 25	15 00	.....
Ploughing	3 72	.....	.....	14 30	3 72
Packing	1 94	0 97	.....	3 90	1 94
Cultivating	.....	.....	0 97	.....	.....
Harrowing	0 82	0 81	.....	.....	0 81
Seed	1 50	6 75	6 75	15 00	6 75
Seeding	1 35	1 35	1 35	2 70	1 35
Scuffling	1 35	1 12	0 90	2 25	1 35
Hoeing	11 00	6 75	15 00	25 00	14 00
Cutting	1 96	2 20	2 20	4 40	2 20
Twine	1 16	1 45	1 45	2 17	1 01
Hauling	14 00	4 20	15 75	24 50	10 50
Ensiling	8 90	24 10	10 08	15 72	6 62
Cost of summer-fallow	.....	23 32	17 80	.....	.....
Total Cost	57 70	88 38	88 50	144 94	60 25
Cost per acre	23 08	35 35	35 40	28 99	24 10
Yield per acre in tons	8 45	11 03	9 71	8 58	6 43
Value per acre at $3 per ton	25 36	33 09	29 13	25 75	19 29
Cost per ton	2 73	3 20	3 64	3 38	3 75
Profit or loss—per acre	2 28	−2 26	−6 27	−3 24	−4 81

COST OF GROWING WHEAT

	Rotation J. 2—Following corn	Rotation R.—Following turnips	Rotation 5-year—Following sunflowers	Rotation R.—Following sun flowers	Rotation J. 2—Following sunflowers	Rotation J. 2—Following hay	Rotation J.—Following wheat	Rotation P.—Following wheat	Rotation P.—Following fallow	Rotation J.—Following fallow	Rotation R.—Following fallow
Area in Acres	2·5	2·5	5	2·5	2·5	5	12	5	5	12	5
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Rent	7 50	7 50	15 00	7 50	7 50	15 00	36 00	15 00	15 00	36 00	15 00
Machinery	2 50	2 50	5 00	2 50	2 50	5 00	12 00	5 00	5 00	12 00	5 00
Manure	.....	5 36	15 00	5 36	.....	.....	.....	12 50	12 50	.....	10 71
Ploughing	3 57	3 90	7 15	3 90	3 57	7 80	17 55	7 15	.....	.....	.....
Cultivating	.....	.....	.....	.....	.....	2 27	.....	.....	1 95	4 55	1 95
Packing	1·95	1·95	4 22	1 95	1·95	1·95	8 45	3 90	1 95	.....	1 95
Harrowing	0 81	0 81	1 95	0 81	0 81	3 25	3 25	1 62	.....	3 90	.....
Seed	3 75	3 75	7 50	3 75	3 75	7 50	18 00	7 50	7 50	18 00	7 50
Seeding	0 82	0 82	1 63	0 82	0 82	1 63	3 57	1 63	1 62	3 57	1 62
Cutting	1 14	0 97	1 95	0 97	1 14	1 95	4 55	2 27	2 28	5 20	2 28
Stooking	0 75	0 75	1 50	0 75	0 75	1 50	3 50	1 50	1 50	4 00	1 75
Twine	0 90	1 27	1 88	1 07	1 55	2 03	6 23	2 03	3 77	9 13	3 62
Threshing	6 37	6 11	14 69	5 33	3 83	14 04	19 76	15 47	21 71	38 15	18 98
Cost of fallow	.....	.....	.....	.....	.....	.....	.....	.....	44 37	103 90	45 02
Total cost	30 06	35 69	77 47	34 71	27 17	63 92	132 86	75 57	119 15	238 40	115 38
Cost per acre	12 02	14 28	15 49	13 88	10 87	12 78	11 07	15 11	23 83	19 87	23 08
Yield per acre—Bushels	19 60	18 80	22 60	16 40	11 80	21 60	12 67	23 80	33 40	24 46	29 20
Value per acre at 80 cts.	15 68	15 04	18 08	13 12	9 44	17 28	10 13	19 04	26 72	19 57	23 36
Cost per bushel	0 61	0 76	0 69	0 85	0 92	0 59	0 87	0 64	0 71	0 81	0 79
Profit or loss per acre	3 66	0 76	2 59	−0 76	−1 43	4 50	−0 94	3 93	2 89	−0 30	0 29

THE EFFECT OF SUNFLOWERS, CORN AND TURNIPS ON FOLLOWING CROP

The object of this experiment was to determine the comparative effect on the following crop of sunflowers versus swede turnips and of sunflowers versus corn. The former was tried on two rotations and the latter on one.

In 1922 the rotation five-acre fields were divided into two plots of two and a half acres each. The yields per acre for 1922 and 1923 are given in the following tables:—

PLOT 6—ROTATION R.—SUNFLOWERS AND TURNIPS

	Tons	lbs.		Grain bush	Straw lbs.
Sunflowers, 1922	15	722	Wheat, 1923	16·4	2,348
Turnips, 1922	16	1,960	Wheat, 1923	18·8	2,492

PLOT 7—ROTATION P.—SUNFLOWERS AND TURNIPS

	Tons	lbs.		Grain bush.	Straw lbs.
Sunflowers, 1922	20	813	Barley, 1923	41·6	2,011
Turnips, 1922	25	1,095	Barley, 1923	48·8	2,478

PLOT 3—ROTATION J. 2—SUNFLOWERS AND CORN

	Tons	lbs.		Grain bush.	Straw lbs.
Sunflowers, 1922	11	1,174	Wheat, 1923	11·8	1,088
Corn, 1922	8	1,571	Wheat, 1923	19·6	1,806

By these tables it would appear that sunflowers are much more exhaustive on the soil than either corn or turnips. These are the first results we have had from this experiment, however, and we should have several years before we draw any definite conclusions.

SUMMARIES OF ROTATIONS

The following tables are summaries of yields, cost, value, and profit or loss per acre, for six rotations. Where the rotation crop has been grown for a number of years an average of yields are given. The yields are in bushels for grain, and tons for hay and intertilled crops. Barley and oats are credited with two dollars a ton for straw which is not shown in the yield column. The results shown on these tables were calculated from the cost and return values statement.

SUMMARY OF ROTATION "P"—EIGHT YEARS
(YIELDS, VALUE, PROFIT AND LOSS PER ACRE

Crop	Yields		Value	Cost of production	Profit or loss (−)
	Average for two years	1923			
			$	$	$
Fallow				8 87	− 8 87
Wheat	34·4	33·4	26 72	14 96	11 76
Wheat	23·3	23·8	19 04	15 11	3 93
Fallow				7 12	−7 12
Sunflowers	15·06	9·70	29 12	28 26	0 86
Turnips	25·84	26·14	39 22	34 72	4 50
Barley (seeded down)	41·0	45·2	20 32	16 99	3 33
Hay	1·33	1·35	12 16	9 01	3 16
Hay	1·39	1·42	12 82	9 08	3 74

SUMMARY OF ROTATION "J-2" SIX YEARS
YIELDS, VALUE, PROFIT AND LOSS PER ACRE

Crop	Yields		Value	Cost of production	Profit or loss (−)
	Average for two years	1923			
			$	$	$
Wheat	21·5	21·6	17 28	12 78	4 50
Sunflowers	9·01	6·43	19 30	24 12	−4 82
Corn	8·62	8·45	25 36	23 08	2 28
Wheat	19·5	15·7	12 56	11 45	1 11
Oats seeded down	44·3	53·6	18 45	14 58	3 87
Hay	1·12	0·93	8 37	6 23	2 14
Hay	.....	1·24	11 20	6 44	4 76

SUMMARY OF ROTATION—FIVE YEAR
YIELDS, VALUE, PROFIT AND LOSS PER ACRE

Crop	Yields		Value	Cost of production	Profit or loss (−)
	Average for two years	1923			
			$	$	$
Sunflowers	9·31	8·58	25 75	28 99	−3 24
Wheat	27·2	22·6	18 08	15 49	2 59
Oats	52·5	57·4	20 02	18 43	1 59
Barley seeded down	35·2	40·4	18 13	17 10	1 03
Hay	.....	1·16	10 44	10 73	−0 29

SUMMARY OF ROTATION "C"—THREE YEARS
YIELDS, VALUE, PROFIT AND LOSS PER ACRE

Crop	Yields		Value	Cost of production	Profit or loss (−)
	Average for two years	1923			
			$	$	$
Fallow	.....	.....	.....	9 17	−9 17
Wheat	.....	24 54	19 63	11 11	8 52
Wheat	.....	28 68	22 94	11 91	11 03

SUMMARY OF ROTATION "R"—NINE YEARS
Yields, Value, Profit and Loss per acre

Crop	Yields		Value	Cost of production	Profit or loss (−)
	Average for two years	1923			
			$ cts.	$ cts.	$ cts.
Fallow	.....	.....	.....	9 33	−9 33
Sunflowers	13·21	11·03	33 09	26 03	7 06
Turnips	22·34	27·70	41 55	31 77	9 78
Wheat	20·8	17·6	14 08	14 08	.....
Oats	52·8	55·8	17 86	16 62	1 24
Fallow	.....	.....	.....	9 00	−9 00
Wheat	35·3	29·2	23 36	14 07	9 29
Oats seeded down	57·2	51·0	18 23	16 97	1 26
Hay	1·09	1·07	9 70	8 44	1 26
Hay	1·18	1·22	11 02	8 58	2 44

SUMMARY OF ROTATION "J"—SIX YEARS
Yields, Value, Profit and Loss per acre

Crop	Yields		Value	Cost of production	Profit or loss (−)
	Average for eleven years	1923			
			$ cts	$ cts.	$ cts.
Fallow				8 66	−8 66
Wheat	26·9	24·46	19 57	11 21	8 36
Wheat	18·7	12·66	10 13	11 07	−0 94
Oats seeded down	36·5	45·5	16 71	13 45	3 26
Hay	0·83	1·2	10 80	6 41	4 39
Hay	0·96	1·2	10 80	6 41	4 39

HORTICULTURE

SEASONAL NOTES

Little snow and considerable freezing and thawing characterized the winter of 1922-23. Despite this the fruit trees and the shrubs in the arboretum wintered well and the weather during the flowering period was favourable for the set of all fruits.

Extremes in temperatures in the early spring, undoubtedly killed off all strawberry plants which lacked protection and seriously checked the development of the outdoor flowering bulbs. Some early vegetables were planted on May 4 but most were sown about May 20.

Cold winds prevailed throughout the greater part of June, with the result that all melons, cucumbers and citrons seeded in the open were killed off.

An unusually heavy precipitation of 10.49 inches was evenly distributed throughout the season from May 25 to August 17 and produced a very rank growth in the vegetable garden, but delayed maturity of many vegetables. The flower borders made a gorgeous showing and the lawns remained green throughout the season.

A killing frost which occurred on September 12 destroyed all bloom and killed off the most of the vegetables prior to maturity.

VEGETABLES

ASPARAGUS

Asparagus is an important crop as it is one of the first of the early vegetables. It is planted early in the spring in rows four feet apart and from one to two feet apart in the row. The first cuttings are made from the third and following year's growth. One asparagus bed in Duck Lake, Saskatchewan, has been cropped continually for more than thirty years and does not show sign of deterioration. It is manured heavily every autumn.

The Washington variety grown on this Station produced an average of eight pounds per 30-foot row in 1923. The season extended from May 29 to June 30.

ARTICHOKE

Tubers of the Jerusalem variety were planted on May 3. The yield from a 30-foot row when harvested on October 12 was 30 pounds. All the tubers were much undersize, being from half an inch to an inch thick, and two to four inches long.

BRUSSELS SPROUTS

Seed of the two varieties, Daniels Colonial and Imperial Dwarf was sown in flats in the cellar on April 16. The young plants were hardened off in the cold frame and set out in the open on May 28. The yield of sprouts when harvested in October was small, averaging only about one pound per plant.

BEANS

To determine by which method the season for green beans could be more easily extended, four varieties, including both late and early maturing, were sown on May 19 and another standard variety was sown on different dates. The season for the different varieties sown on May 19 extended from August 1 to September 2 and that for Round Pod Kidney was sown at different times from May 19 to June 5 was from August 2 to September 3.

To determine the relative yields of beans as a green table vegetable, when sown at 2, 4 and 6 inches apart in the row, two varieties were sown on May 19. Those sown 6 inches apart yielded 23 pounds; 18 pounds where spacing was 4 inches; and 14 pounds where spacing was 2 inches.

POLE BEANS AND BROAD BEANS

Three varieties of Pole beans were grown in 1923. They were ready for use the first week in August but owing to the early frost, no ripe seed was obtained this season. One variety of Broad beans was ready for use the last week in July and from a 20-foot row 5 pounds of ripe seed was obtained.

BEETS

Six varieties and strains were sown in the open on May 3 in rows 20 inches apart. From a standpoint of yield together with quality and smoothness of roots the following varieties are recommended: Black Blood Red, Eclipse, and Detroit Dark Red.

CABBAGE

Fifteen varieties of cabbage were grown in 1923. Of these, eleven varieties were sown in the cold frame on May 2 and transplanted on June 14. In addition several varieties were sown in flats in the cellar on April 6 and transplanted to the hotbed on April 16. The plants were hardened off in the cold frame and set out in the open on May 28. In each case the rows were two and one-half feet apart with the plants set two feet apart in the row. The first heads were cut about the middle of July from the plants raised in the hotbed, whereas it was the last week in July before those sown in the cold frame were ready for use.

The largest yield was cut from the plants raised in the hotbed. For early cabbage or as market garden varieties, Copenhagen Market and Early Jersey Wakefield are recommended, while Danish Ballhead is a late variety, being firmer and more compact, thus a good keeper for winter use.

Date of Sowing.—Two varieties of cabbage were sown in the open. The rows were two and one-half feet apart with the plants thinned to two feet apart in the row. Three successive sowings of each variety were made at intervals of ten days between sowings. The early sowings yielded much higher.

With a view to determine the advantage of growing cabbage for the purpose of feeding to live stock, an acre of cabbage of the Copenhagen Market variety was sown with the grain drill on May 22 in rows two and a half feet apart and thinned to 24 inches apart in the row. The yield was determined from a measured half-acre and yielded at the rate of 26 tons, 1,906 pounds per acre. From analysis, 10.47 per cent or 2 tons, 1,644 pounds per acre was dry matter.

Some of this cabbage was fed in the fall to milch cows. It proved appetizing and tended to keep up the milk flow after the pasture was exhausted. The rest

of the cabbage were piled out of doors in narrow piles. They will be thawed and fed immediately to livestock throughout the winter season and results noted.

CARROTS

Four varieties and strains were grown in 1923. The seed was sown in rows 20 inches apart on May 5. Chantenay and Half Long Scarlet Nantes are highly recommended for home use both in point of yield and quality.

CAULIFLOWER

The experiment to determine whether it is better to start cauliflower plants in the hotbed and transplant them to the open or sow the seed in the open, was continued. Seed of two varieties was sown in the hotbed on April 6 and transplanted to the open on May 28 and seed of one of the two varieties was sown in the open on May 16 and transplanted on June 14.

Plants developed in the hotbed produced heads from two to three weeks earlier but the yield was much smaller than from the plants developed in the open.

CUCUMBER

Four varieties of cucumbers were sown in flower-pots in the cellar on April 10 and transferred to the hotbed on June 24. During the last week of June they were transplanted to the cold frames and grown under glass. Five varieties were sown in the open on June 6; but practically all plants were killed off about the middle of June, owing to prevailing cold damp winds.

Of those under glass Giant Pera, Improved Long Green, and Davis Perfect are recommended.

CELERY

Several varieties were grown with a view to blanching in the cellar. Unfortunately eleven degrees of frost on September 12 cut off the green growth and renderd it impossible to conduct the experiment. A row of celeriac was grown and when lifted, twelve average heads weighed five pounds.

Two varieties were transplanted from the cold frame on June 21 for the purpose of comparing level culture with trench culture. A 30-foot row of each variety was planted in a trench, and the same on the level. In each case before planting, a furrow was opened up, and six inches of well rotted manure was firmly tramped in the bottom. Sufficient loose earth was added on this in which to set the plants. Each row was eighteen inches wide and consisted of two lines of plants set nine inches apart each way. The young plants were watered well in the early part of the season, and in order to blanch the celery, the rows were earthed up.

This experiment has been tried for several years and the yield and quality have been practically the same. There is considerably less work in growing on the level.

TABLE CORN

Seventeen varieties of corn were seeded in the open in 1923. The seed was sown in rows four feet apart and the plants thinned to six inches. The following varieties are recommended and are listed in order of maturity: Early Squaw, Pickaninny, Nuetta, Malakoff, Golden Bantam, Gehu.

KOHL RABI

The variety Giant Purple Vienna was grown in 1923. The seed was sown on May 4 in rows two feet apart. The plants were spaced to six inches and were ready for use by the first week in August. When harvested on October 12 a 30-foot row yielded 105 pounds.

LEEKS

Three varieties were grown in 1923. The seed was sown in pots in the cellar on April 10, transferred to the hotbed April 16 and hardened off in the cold frame. The plants were set out 2 inches apart in rows 18 inches apart.

Dobbie Prize and Giant Carentan are both excellent varieties.

LETTUCE

Fourteen varieties of lettuce were sown in the garden on May 28 in rows 18 inches apart. The seed germinated on June 13, and all varieties grew well. The plants were thinned to six inches apart in the row. Both the loose-leaf and cabbage type of lettuce are to be recommended, the former from a standpoint of earliness, while the latter is superior in crispness, flavour and yield. Grand Rapids is the favourite variety for a crop of loose-leaf, and as a cabbage type the Hanson produced much the heaviest heads.

Lengthening the Season.—With a view to determine whether the season would be extended sufficiently long to justify the practice of transplanting lettuce as a commercial proposition, a 30-foot row of each fourteen varieties was transplanted on June 18. It was found that transplanting serves as a check to the growth of the plants and thus prolongs the season from ten to fourteen days. In order to provide greens from this source throughout the summer, this practice is to be recommended in addition to a succession of sowings.

ONIONS

Fourteen varieties or strains of onions were grown in 1923. They were seeded in the open on April 28 in drills 18 inches apart. The seed germinated about May 19 and the plants were thinned to one inch apart in the row. In addition an experiment was conducted with some of the varieties to ascertain the advantage of seeding in the hotbed and transplanting to the open.

Onions transplant easily, and the practice is recommended if a good yield of large sized early onions is desired. The usual custom of bending down the tops when growth has almost ceased, serves three purposes; it checks the development of thick necks, conserves the strength and hastens the ripening.

Large Red Wethersfield and Yellow Globe Danvers are two of the best varieties for culinary uses. Early White Barletta is a splendid pickling onion, while Ailsa Craig is one of the best exhibition sorts.

POTATOES

Combining all varieties and experiments, the potato yields were above average this season. Though dry until the middle of June, this lack of moisture did not affect the potatoes as much as some other crops. Some of the later varieties grew exceptionally heavy tops which were still green when frozen down on September 12. The tubers were also immature when dug twelve days later. Considerable black leg and rhizoctonia escaped notice due to the heavy growth. Rhizoctonia caused the greatest loss in yield.

Potato Varieties.—The standing of varieties in point of yield is very different from that of 1922. This was due to several factors; but should not lower our opinion of the two standard varieties, Irish Cobbler and Early Ohio. These two are exceptionally good cooking potatoes. Early Ohio, Gold Nugget, Bovee and Irish Cobbler were on slightly higher ground than the other varieties. They were also attacked by early blight, though Irish Cobbler showed considerable resistance. The blight was first noticed August 3 on the Bovee, and by August 20 had spread to Gold Nugget and Early Ohio which adjoined it on the west. Irish Cobbler, the next to the east of Bovee, was not badly affected until late in the season, while the remaining varieties suffered almost no damage. As a precautionary measure against possible infection another year, all stalks were burned.

POTATO VARIETIES—YIELDS

Name of variety	Stage of maturity	Large or saleable	Small	Total
		bush.	bush.	bush.
Morgan Seedling	Immature	585	31	616
Wee MacGregor	Immature	540	65	605
Moneymaker	Immature	569	33	602
Rochester Rose	Mature	474	113	587
Carman No. 1	Immature	513	71	584
Rawlings Kidney	Immature	509	73	582
Empire State	Mature	505	56	561
Everett	Mature	428	97	525
Dalmeny Beauty	Immature	486	32	518
Late Puritan	Mature	449	66	515
Dreer Standard	Immature	451	47	498
Irish Cobbler	Mature	386	103	489
Reeves Rose	Mature	368	101	469
Bovee	Mature	323	95	418
Vick Extra Early	Mature	311	106	417
Gold Nugget	Mature	254	120	374
Early Ohio	Mature	303	65	368

Sets.—Eight plots were planted with eight different kinds of sets. The sprouted were exposed to light and heat for 36 days before planting, the sprouts then being about one and one-half inches long. The whole potatoes in each case yielded a high percentage of small and unsaleable. Seed end and stem end cuttings both yielded low, though the advantage went to the stem end. In a four-year average, the stem end was superior to the seed end, the latter only yielding high once in that time. The results from one, two, and three-eye cuttings are very inconsistent. In a four-year average the greatest number of eyes gave the largest yield, while this year's results favour the two-eye cuttings. The one and two-eye sets gave the largest yield of saleable potatoes in the experiment this year. The sprouted potatoes cut to two eyes did not yield high; but emerged about a week earlier than any of the others, and were fit for use at least a week sooner.

Dates of Planting.—Commencing on May 8 one plot was planted on each of four dates at two-week intervals. The highest yield this year was produced by the earliest planting. The same experiment carried on in 1915 gave similar results.

Depth of Planting and Cultivation.—Three double plots of potatoes were planted at three depths of two, four and six inches. Half of each plot was hilled late in the season, and the remainder left level. This experiment has been carried on for nine years, and the results have been irregular. However, considering the extra work of planting six inches over that of four inches and of hilling, the conclusion derived from the nine years is that potatoes should be planted four inches deep and left unhilled.

Distance of Planting.—Three plots were planted at different distances, 12 by 30 inches, 14 by 33 inches, and 15 by 36 inches; the first figure referring to the spacing between plants in the rows, and the second to spacing between the rows. This experiment has been carried on for eight years, and an average shows the highest yield from the closest planting, while the medium spacing gave the best returns this season. The conclusion from this experiment is that the most satisfactory distance to plant potatoes is thirty inches between the rows with plants twelve to fourteen inches apart in the row.

Seed.—In 1921 samples of Irish Cobbler potatoes were sent to Silver Stream, Debden and Scott. Seed grown from these samples was returned and grown here in 1922 and 1923 in comparison with Rosthern-grown seed.

The same experiment was carried on the following year by sending seed grown at Rosthern in 1921 to Beaverlodge, Debden, and Scott in 1922. Samples were returned and seed from the three places was grown in comparison with seed grown at Rosthern. Silver Stream, Debden, and Beaverlodge are north of Rosthern, while Scott is south.

The yields both years were higher from seed received from north and lower from seed received from south of Rosthern.

Date of Digging.—Irish Cobbler potatoes were dug on eight dates at one week intervals, commencing July 31. The experiment was to determine the difference in yield at each date of digging, and to ascertain whether immature or well-matured tubers make the better seed. The latter part of the experiment will not be carried out until the following year. The tops were frozen down on September 12 and were withered at the last digging. From the one year's results, it would appear that while an increased yield was gained for each week left in the ground, this increase was very small during the last month.

PARSNIPS

Two varieties of parsnips were tested this year. The seed was sown on May 3 in rows two feet apart and the plants thinned to three inches. Cooper Champion was the most desirable variety.

An experiment was conducted to compare the different dates of sowing a good standard variety and five successive sowings were made at intervals of ten days. When harvested on October 12 the yields and quality were very much in favour of the earliest sowings.

PEAS

To ascertain by which method the season for green peas could be more easily extended, four varieties, which include both late and early maturing, were sown on May 21 and compared with different dates of sowing a good standard variety.

The season for the different varieties sown on May 21 extended from July 30 to August 28 and that for Thos. Laxton, sown at different dates from May 21 to June 12, was from July 14 to August 8.

Distance Apart of Planting.—To determine the relative earliness, quality and yield as a green table vegetable, three varieties of garden peas were sown in rows 30 inches apart. The seed was planted 1, 2 and 3 inches apart. Those sown 1 inch apart yielded 51 pounds to 43 pounds where spacing was 2 inches and 34 pounds where spacing was 3 inches.

PEPPERS

Five varieties of peppers were tested in 1923. The seed was sown in the cellar, transferred to the hot bed, pricked out to the cold frame and transplanted to the open about the third week of June. Though all varieties grew well, not one reached maturity.

Harris Earliest and Squash varieties produced the largest yield of green fruit.

PUMPKINS

To ascertain whether the yield is increased sufficiently to warrant the practice of starting pumpkins in the hotbed, seed of four varieties was sown in pots on April 9, transferred to the hotbed on April 16 and set out in the open on May 21. Seed of the same varieties was sown in the open on June 6. Three plants were left to each hill, which were spaced six feet apart in rows eight feet apart and the crop was harvested the second week of September.

The yields were 410 pounds from those started in the hotbed as against 374 pounds from those started in the open.

RHUBARB

An experiment was conducted with a view to obtaining early rhubarb. Boxes two feet square were placed over the plants on the open ground on May 14. There were six groups of six plants each, three groups of which had manure placed around the boxes, while the other three groups had no protection except the boxes. These plants were set out the previous year. The first cutting was made on May 29 when the stalks averaged about two feet in length. The yields from May 29 to June 20 for 6 plants ran as high as 48 pounds.

Seedlings.—With the object of conducting a variety test, six strains of rhubarb seed were sown in nursery rows on May 4. The young roots were transplanted to the rhubarb plantation in the autumn and set two feet apart in rows three feet apart. The plants developed stalks from 2¼ to 3½ inches in circumference and from 12 to 20 inches in length.

SALSIFY

Salsify or the Oyster Plant is a vegetable which possesses a distinct rich flavour. Seed of the Long White French variety was sown in the open on May 4 in rows two feet apart. The plants were spaced to six inches and when harvested on October 13, the weight from a 30-foot row was 24 pounds.

SEAKALE

Roots or thongs were planted in May and by autumn had produced crowns which were excellent for forcing. These crowns were lifted, stored in the cellar and as required are to be placed in soil in some dark corner near the furnace. About five weeks later they will be ready for cutting as greens.

SQUASH

To determine whether the yield can be increased by starting squash in the hotbed, five varieties were sown and planted similar to that of the pumpkins. The yields were 545 pounds from those started in the hotbed as against 406 pounds from those started in the open.

SWISS CHARD

Seed of the variety Giant Lucullus was sown in the open on May 4, and was ready for use as greens by the middle of July. By the end of September the weight of ten average heads was 25 pounds.

EGG PLANT

The variety, New York Purple, was grown in 1923. No fruit formed.

RADISH

Six varieties of radish were grown in 1923. The seed was sown on May 4 and all varieties with the exception of Chartier gave a good germination. Of the spring varieties Twenty-day was the earliest, while Icicle remained fit for use for the longest season.

Black Spanish develops large round roots of good texture. They stand in the following order of merit: Twenty-day, Icicle, Rennie XXX, Scarlet Oval, XXX Scarlet Oval Ottawa 2252, Long Black Spanish Winter, Chartier.

TURNIPS

Seed of the four varieties, Extra Early Purple Milan, Red Top Strap Leaf, Early Snowball, Golden Ball was sown in the open on May 21 in rows two feet

apart. The seed germinated on May 31 and the plants were thinned to six inches. All were equally good for quality but possessed a somewhat bitter flavour.

TOMATOES

Nineteen varieties or strains of tomatoes were grown in 1923. They were sown in flower-pots in the cellar on April 6 and germinated about April 20. The young plants were pricked out to the hotbed during the second week of May, hardened off in the cold frame and transplanted to the open about the middle of June. A rainfall of over six inches during July and August resulted in a very rank growth of all varieties and as considerable fruit had formed prior to trimming and staking, maturity was delayed. No ripe tomatoes were picked until the first week of September, and the frost which occurred on September 12 cut off all vines and rendered it impossible to obtain any comparable results.

It is noteworthy that no matured fruit was obtained from those plants which were not trimmed and staked. This would again indicate that staking and pruning is an effective means of hastening maturity and increasing the yields of ripe fruit, and would emphasize the necessity of growing early maturing varieties for this district.

TREE FRUITS

APPLES

With the view of producing an apple orchard which would be hardy and would succeed well in this northern district, several varieties of crabapples were grafted on to a hardy siberian crab root and planted out in 1911. Quite a number died during the first few years and had to be replaced. In 1923 sixty-four trees bore crabapples of good quality, seventy-four are producing fruit of the old stock and the remaining thirty-six yielded no fruit. The average size of the crabapples is about one and one-quarter inch and though this seems small, the fruit is suitable for jelly and preserves.

The trees on the Station came through the winter of 1922-23 in good condition, and no injury of any consequence was noticed. Black heart is present in some of the trees, with the result that two were so badly weakened that they split at the base and broke down under the heavy load of fruit. The majority of the trees carried a very heavy bloom and escaped any injury from late frosts. A few trees were infested with the tent caterpillar, the webs of which were cut and burnt as they appeared. Fifty-seven bushels of crabapples were harvested and the fruit consisted of the following varieties, Osman No. 1, Magnus, Pioneer, Tony, Charles, Columbia, Jewel, Norman, Prince. Of the early varieties, Osman No. 1 is the principal one. The fruit of this variety has a dark red skin and is somewhat soft in texture. Pioneer, Norman and Tony are later varieties, and are firmer and of superior quality.

PLUMS

The plum trees on this Station represent a Cheney selection from the wild plum *Prunus nigra,* which is a native of Canada and United States. The original orchard has been gradually thinned out until only those trees survive which have proved hardy and are bearing fruit which is considered to be of value for propagation. These Cheney selections have been found to mature early, and though the fruit is small it is valuable for preserves.

The majority of the trees carried a heavy bloom in the spring of 1923 and no disease of any kind was noticed in the orchard throughout the summer. This may have been the result of an application of lime-sulphur in the fall of 1922, followed by an application of Bordeaux in the spring of 1923.

Two-hundred and seventy-six standard berry boxes, or two-hundred and twenty-one quarts, of plums were picked, and 90 per cent of this fruit was matured and ripe before the heavy frost on September 12. The fruit varies much in quality, form and colour, but most of the trees produced plums possessing desirable qualities.

SMALL FRUITS

RASPBERRIES

The abundant rainfall and sunshine during the summer of 1923 produced good growth with the result that the eight varieties of raspberries, which compose the variety test, yielded good crops. The yields per acre given below are based upon the yields from one hundred and twentieth acre areas and are stated in standard berry boxes (s.b.b.) which contain four-fifths of a quart.

NOTE.—By mistake the area of each variety was reckoned as one-twelfth-acre in 1922 and therefore the yield per acre should be ten times that given in the 1922 report.

RASPBERRIES—VARIETY TEST

Variety	Yield per acre 1923	Average yield per acre 1922-23
	s.b.b.*	s.b.b.*
Newman No. 23	6,750	4,845
Miller	5,760	5,700
Sunbeam	5,340	4,710
The King	5,220	3,675
Latham (Minnesota No. 4)	5,160	5,070
Ohta	5,160	3,660
St. Regis	4,440	4,395
Herbert	4,350	5,160

*Standard Berry Box—four-fifths of a quart.

As will be noticed the Newman No. 23 is a heavy yielder, but is to a slight extent excelled both in point of flavour and size of fruit by the Herbert. Compared with the Miller, these two varieties are of much superior quality. The Sunbeam is quite hardy, but the fruit is inferior in flavour and not of a desirable colour. Herbert is the most desirable variety.

In autumn, the practice at this Station is to cut out the old and weak canes. The good ones are bent over and held down with a few shovelsful of earth, and covered with straw or slough hay, which affords ample protection for the winter.

RED CURRANTS

The eight varieties of red currants set out in 1920 came into bearing for the first time this year. The imported currant worm *(Pteronus ribesii)* appeared about the middle of June, and was quickly destroyed by the application of a poisoned spray composed of one pound Paris green to forty gallons of water, with enough slaked lime to give the mixture a milky colour in order to prevent the burning action of free arsenic. The white maggot did considerable injury to all varieties during the growing season with the result the yields were low. The highest yields were obtained from Red Dutch, Red Cross, Stewart and Ruby Castle.

The system adopted for pruning currant bushes on this Station is as follows: In the case of black currants, all wood over two years or weak shoots of the season's growth is removed. In the case of red currants, the fruit is produced on spurs which develop from wood two or more years of age. By removing all

branches more than three years of age, the bush can be kept sufficiently open to admit light and sunshine.

BLACK CURRANTS

The black currants under test were set out in 1920. The rows are six feet apart with twelve clumps to a 60-foot row. The yields obtained in 1923 and the average yields for two years are as follows:—

BLACK CURRANTS—VARIETY TEST

Variety	Source	Yield from twelve bushes	Average yield from twelve bushes (2 years)
		s.b.b.*	s.b.b.*
Climax	O-1348	54·0	46·3
Magnus	O-1338	57·0	38·5
Eagle	O-1326	47·0	36·3
Kerry	O-1317	45·0	34·0
Lee prolific	Cuttings	12·0	7·0
Topsy	O-1327	10·0	7·5
Boskoop Giant	Cuttings	10·5	5·8
Buddenborg	Cuttings	7·5	4·3

*Standard Berry Box—four-fifths of a quart.

The fact that the black currants were not infested with the maggot or injured by the imported currant worm *(Pteronus ribesii)* may partially explain the increased yields this year. From point of flavour and size of fruit the Lee Prolific, is much superior to any of the rest. The bushes of this variety have not had the growth of some of the other varieties, which may in part account for the low yield. Magnus and Climax are both heavy yielders of good fruit and all varieties have proved hardy at the Rosthern Station.

GOOSEBERRIES

The two varieties of gooseberries set out in 1920 gave a small yield this summer. Both varieties are quite hardy, but the bushes are somewhat weak and slow in developing. The varieties under test are Carrie and Houghton.

STRAWBERRIES

Owing to the extremes in temperature during the spring of 1923 there was only a small strawberry plantation, including four varieties which came through successfully. The fact that this area was not killed out may be attributed to the protection afforded by a covering of slough hay. As strawberries require this protection, most especially during the period of thawing and freezing, they may be covered any time after freeze-up. These plants were set out in the spring of 1922.

The Rosthern June Bearing variety is a very heavy yielder of large well-formed berries, but the Senator Dunlap excels it in flavour, colour and firmness of fruit.

With a view to obtaining all the information possible relative to growing strawberries commercially in this district, one half of an acre was planted in May of this year. The varieties used were Rosthern June Bearing and Dakota. The plants were set two feet apart in rows three feet apart and were kept well cultivated throughout the season.

The following varieties were planted out in 1923, Dakota, Senator, Dunlap, Rosthern June Bearing, Minnesota, Portia, Lavinia, Hermia, Cassandra. With the exception of the last three mentioned all made excellent growth during the season and have gone into winter in good condition.

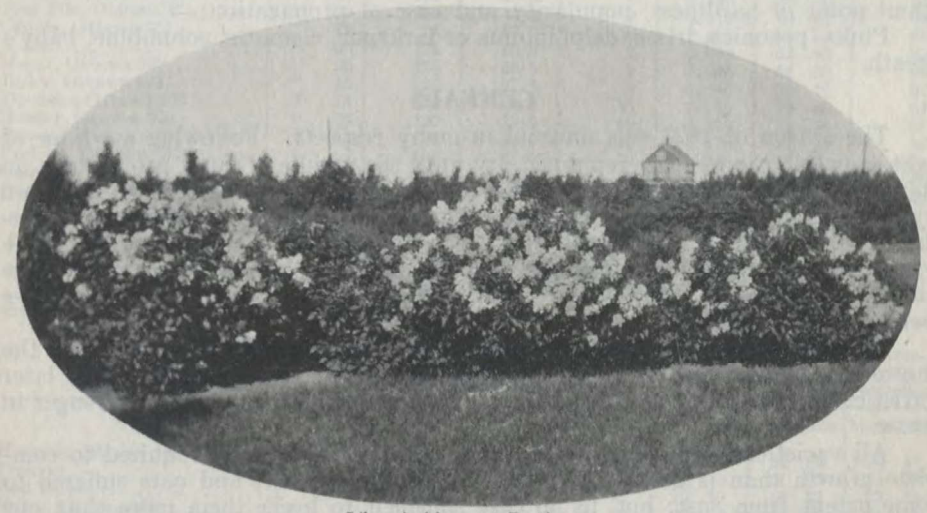
ORNAMENTAL GARDENING

TREES AND SHRUBS

The profuse and gorgeous bloom of the flowering shrubs in the arboretum from about May 24 to the last week in June gives a remarkably fine picture. The arrangement is natural, but the effect attracts the attention of all visitors. Not only in the springtime, but throughout the summer months, the deciduous shrubs interspersed with groups of coniferous trees provide an appropriate form of lawn decoration for the prairie home. The lilacs comprise the largest group of ornamental shrubs on the Station and consist of seven species and a large number of varieties. They are possibly the most popular flowering shrub, and in addition to their gorgeous bloom, they possess a heavy foliage free from insect attacks. Of the common purple varieties, the following are especially attractive:—

Souvenir de L. Spæth, Congo, Marc Micheli, Michael Buchner, Charles Joly, Charles X. Among the white sorts of merit are: Marie Legraye, Madame Casimir Perier, Madame Abel Chatenay, Alba Grandiflora.

Syringa villosa, Josikæa, Japonica and Emodi are the best late lilacs grown here, and though they do not possess the fragrance and rich appearance of the vulgaris sorts, yet they extend the season of blooming from two to three weeks longer.



Lilacs in bloom at Rosthern.

The following trees and shrubs have made splendid development at this Station and are among those recommended for lawn beautification, either as individuals or as hedges:—

Pygmy Caragana *(Caragana pygmæa)*, *Tartarian honeysuckle (Lonicera tatarica)*, Snowberry *(Symphoricarpus occidentalis)*, Tartarian maple *(Acer tataricum)*, buffalo berry *(Shepherdia Argentea)*, white spruce *(Picea canadensis)*, laurel-leaved willow *(Salix pentandra)*, sharp-leaved cotoneaster *(Cotoneaster acutifolia)*, common lilac *(Syringa vulgaris)*, Siberian pea tree *(Caragana arborescens)*, native plum *(Prunus nigra)*, sorbus-leaved spiræa *(Spiræa sorbifolia)*, American larch or tamarack *(Larix laricina)*.

Russian poplar *(Populus petrowskyana)* white spruce *(Picea canadensis)*. Siberian pea tree *(Caragana arborescens)* have all proven extremely hardy here and are desirable where an effective windbreak is required. The caragana, like the Russian poplar, is a rapid growing shrub and when planted from seed will

afford considerable protection to the young fruit orchard or vegetable garden when five years old.

Seed of several additional varieties of trees and shrubs, including native and imported, were sown in the nursery beds during the fall of 1923.

FLORICULTURE

The annual flowers in 1923 made a wonderful showing with a profusion of bloom from July 1 to September 12. Owing to ideal growth conditions which prevailed throughout the season, all species did well, even though it was late before some varieties were transplanted to the open. Several of the half-hardy varieties or strains of annuals were started from seed sown in flats in the cellar and transferred to the hotbed April 10. They were pricked out and hardened off in the cold frame about the middle of May and set in the annual borders during the week commencing June 18. Of those tested the following are to be recommended for landscape effects:—

Alyssum, lobelia, phlox drummondii, petunia, early asters, ageratum, stocks, marigolds, antirrhinums, nicotiana, dianthus, linaria, mignonette, dahlias, gladioli.

The perennial border furnished a gorgeous display from the middle of June until the frost in September and was a source of attraction to all visitors. Of the different perennial flowers under test the following are recommended from a stand point of hardiness, popularity and ease of propagation:—

Pinks, peaonies, irises, delphiniums or larkspur, clematis, columbine, baby's breath.

CEREALS

The season of 1923 was unusual in many respects. Following a winter of light snowfall, the weather remained dry until the middle of June, after which an abundance of rain fell, well distributed throughout the growing season. Autumn was dry and nearly ideal for harvest. Due to the unusual weather conditions, the order of yield in the variety tests was different from the average. Some which under normal conditions are high were lowered, while others of average yield were high. Excepting on well worked summer-fallow, early varieties were at a disadvantage.

The dry spring caused a quick growth and those early enough to be in the shotblade, before rain arrived, necessarily formed small heads. The later varieties benefited by the rain in head formation, and were, also, much longer in straw.

All varieties filled well though about ten days more were required to complete growth than is usual. The later varieties of wheat and oats suffered to some extent from rust; but, in no case sufficient to lower them more than one grade.

Several strong winds before harvest badly lodged the weaker strawed varieties, and made harvesting difficult.

WHEAT

Seventeen varieties of wheat were tried under similar conditions on summer-fallow.

Garnet, an early variety, produced the highest yield, but as this is the first time it has stood so high while being grown here, we would not recommend it above some of the older sorts. There is no doubt, however, that it is one of the best early wheats we have under test.

Kinley, also, yielded well, but was very late. Kota was low, but was resistant to stem rust. One undesirable feature is the weak straw which went nearly flat before cutting time. This did not appear to affect the filling, but made cutting very difficult.

Two varieties of Emmer were tested. The common strain showed a decided weakness in straw.

Garnet and Ruby, two early varieties, were tested side by side on prairie breaking with the following results. The area of each plot was one acre and the soil on both plots was very similar. Both ripened in 111 days and were 33 inches in height, Garnet yielded 28.4 bushels while Ruby yielded 21.7 bushels.

WHEAT—TEST OF VARIETIES OR STRAINS

Sown on fallow, April 18, 1923

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Yield of grain per acre	Yield of grain per acre	Weight per measured bushel after cleaning
			inch		lbs.	bush. lbs.	lbs.
Garnet, Ottawa 652	Aug. 15	120	36·0	9	2,640	44 00	63·2
Kinley	" 29	134	45·0	9	2,460	41 00	62·6
Early Triumph	" 20	125	38·0	10	2,320	38 40	61·8
Preston	" 27	132	43·5	8	2,310	38 30	63·0
Supreme	" 23	128	36·0	10	2,220	37 00	62·0
Marquis, Ottawa 15	" 25	130	39·0	8	2,217	36 57	63·0
Kitchener	" 27	132	41·5	10	2,200	36 40	62·6
Kubanka, Ottawa 37	" 27	132	46·0	6	2,180	36 20	64·0
Red Fife, Ottawa 17	" 29	134	41·0	9	2,112·5	35 12	63·0
Crown, Ottawa 353	" 16	121	36·0	10	2,010	33 30	63·0
Kota	" 23	128	40·0	2	1,960	32 40	63·5
Major, Ottawa 522	" 20	125	38·5	9	1,890	31 30	63·0
Ruby, Ottawa 623	" 15	120	37·5	9	1,840	30 40	62·5
Duchess, Ottawa 933	" 15	120	30·5	10	1,740	29 00	64·0
Master, Ottawa 520	" 15	120	33·0	10	1,470	24 30	61·0
Reward, Ottawa 928	" 15	120	32·5	10	1,470	24 30	63·6
Prelude, Ottawa 135	" 4	109	28·0	10	920	15 20	61·8
Common Emmer	" 23	128	39·5	2	2,340	39 00	43·0
Early Ottawa 44, Emmer	" 23	128	39·0	7	2,190	36 30	52·5

WHEAT—TEST OF VARIETIES

Sown on fall-ploughed wheat stubble, April 20

——	Number of days maturing	Length of straw and head	Yield per acre			Three-year average
			1923	1922	1921	
			bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.
Marquis, Ottawa 15	120	35·5	27 23	28 00	24 40	26 41
Preston	120	36·0	27 20	25 10	21 00	24 30
Red Bobs	120	33·5	23 30	29 50	18 32	23 57
Ruby, Ottawa 623	111	30·0	16 23	23 45	24 08	21 25

OATS

The oat varieties yielded about average and the sample of threshed grain was very good. All were badly infested with rust, but the resulting damage was very small.

A selection of Banner sent to us by Cay of Beatty, Saskatchewan, gave the highest yield. This is the first season it has been under test, and as the seed was much superior to that of our own growing, the high yield may have been due to better germination. This plot was much thicker in stand than any of the others and with an abundance of rain this was a decided advantage.

Prolific and Columbian are new selections from Ottawa, tested for the first time this season.

OATS—TEST OF VARIETIES OR STRAINS
Sown on fallow, April 20, 1923

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Yield of grain per acre	Yield of grain per acre	Weight per measured bushel after cleaning
			inch		lbs.	bush. lbs.	lbs.
Banner from Cay	Aug. 19	122	43·0	8	2,820	82 32	42·0
Gold Rain	" 20	123	45·0	8	2,599	76 15	45·2
Daubeney, Ottawa 47	" 8	111	36·5	8	2,520	74 04	38·9
Victory	" 21	124	45·5	9	2,480	72 32	45·6
Legacy, Ottawa 678	" 21	124	43·0	7	2,460	72 12	39·0
Leader	" 21	124	41·5	8	2,450	72 02	39·0
Alaska	" 8	111	37·5	8	2,370	69 24	39·5
Columbian, Ottawa 98	" 20	123	46·0	6	2,360	69 14	43·5
Banner, Rosthern seed	" 20	123	45·0	8	2,280	67 02	43·2
Gerlach	" 21	124	44·5	9	2,200	64 24	45·2
Prolific, Ottawa 77	" 20	123	46·0	6	2,200	64 24	44·0
O.A.C. No. 72	" 20	123	44·5	9	2,150	63 08	44·0
Longfellow, Ottawa 478	" 17	120	46·5	8	1,960	57 22	42·0
Liberty, Ottawa 480	" 15	118	43·0	10	1,840	54 04	52·0
On fall-plowed oat stubble sown April 24, 1923—							
Banner, Ottawa 49	" 13	112	36·0	10	2,230	65 20	41·0
Victory	" 13	112	34·0	10	2,033	59 27	43·0
Longfellow, Ottawa 478	" 8	107	38·0	9	1,785	52 17	40·0
O.A.C. No. 72	" 13	112	34·0	10	1,775	52 07	42·0

BARLEY

The season of 1923 proved very satisfactory for barley. The yields were good and the kernel well filled with no rust at any time. Most varieties grew long straw and the weakness was very marked in some cases. Gold, Hannchen and Trebi were nearly flat on the ground when harvested, and while this did not appear to check filling, it made harvesting very difficult. The unusual growth due to an abundance of moisture was very likely responsible for bringing out this weakness of straw.

BARLEY—TEST OF VARIETIES OR STRAINS
Sown on fallow, May 2, 1923

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Yield of grain per acre	Yield of grain per acre	Weight per measured bushel after cleaning
			inch		lbs.	bush. lbs.	lbs.
Gold	Aug. 23	114	37·0	2·0	2·920	60 40	55·8
Trebi	" 18	109	37·0	3·0	2,880	60 00	49·6
Hannchen	" 20	111	41·0	2·0	2,865	59 33	53·0
Barks	" 21	112	35·5	10·0	2,660	55 20	50·4
Chinese, Ottawa 60	" 18	109	43·5	8·0	2,516	52 20	53·1
O.A.C. No. 21	" 15	106	40·5	7·0	2,497	52 01	50·0
Feeder, Ottawa 561	" 16	107	48·0	7·0	2,320	48 16	53·0
Early Chevalier, Ottawa 51	" 16	107	44·0	6·0	2,240	46 32	53·1
Success	" 8	99	41·5	7·0	2,140	44 28	49·0
Himalayan, Ottawa 59	" 8	99	32·0	7·0	1,900	39 28	62·1
Stella, Ottawa 58	" 15	106	41·5	8·0	1,740	36 12	52·2
Junior, Ottawa 471	" 9	100	32·5	7·0	1,700	35 20	62·0
Albert, Ottawa 54	" 4	95	34·5	8·5	1,370	28 26	49·0
Sown on fall-ploughed stubble, May 4th, 1923							
Hannchen	Aug. 13	102	27·0	8·0	2,503	52 07	53·8
Barks	" 13	102	27·0	10·0	2,325	48 21	47·0
O.A.C. No. 21	" 8	97	31·5	8·0	2,226	46 18	49·0
Trebi	" 4	93	26·5	6·0	1,753	36 25	48·0

WINTER RYE

Common winter rye, a strain grown successfully at this Station for several years, wintered well, showing its superiority in this respect over Rosen and Ottawa in the winter of 1922-23. In the winter of 1921-22 Rosen and Ottawa wintered well and outyielded the common variety.

The winter of 1922-23 was very hard on winter annuals and Rosen and Ottawa, for all practical purposes, were totally winter-killed. The few plants which did survive, stooled greatly, and ripened much later than the common strain.

DATES OF SOWING WINTER RYE

All plots, with the exception of the last sowing, made a good start before the ground froze in 1922. The winter was very severe on all winter-annuals and perennials due to a very light snowfall which came late and several early thaws before the final break up in the spring.

All sowings made before the middle of August, 1922, could be considered as a total loss due to winter-killing, while the sowing on September 25 gave the largest returns.

The October 24 sowing was made just before the ground froze and did not germinate until the spring of 1923. In this respect it really takes the place of annual rye and can hardly be compared with the other sowings. It ripened about the same time as annual or spring rye.

WINTER RYE—DATES OF SOWING

Date Sown	Date of ripering	Number of days maturing	Average length of straw including head	Yield of grain per acre	Yield of grain per acre
			inches	lbs.	Bush. lbs.
July 3, 1922			34		
July 10, 1932			33		
July 24, 1922	July 31	372	33	140	2 28
July 31, 1922	" 30	364	32	140	2 28
Aug. 7, 1922	" 30	358	30	40	0 40
Aug. 14, 1922	" 28	348	31	140	2 28
Aug. 21, 1922	" 28	341	35	660	11 44
Aug. 28, 1922	" 28	334	35	1,400	25 00
Sept. 4, 1922	" 28	327	34	1,480	26 24
Sept. 11, 1922	" 28	320	36	1,380	24 36
Sept. 18, 1922	" 28	313	37	1,460	26 04
Sept. 25, 1922	" 30	308	38	1,640	29 16
Oct. 24, 1922	Aug. 18	298	42	1,800	32 08

PEAS

The yield of threshed peas was below average due to the difficulty in sowing them deep enough on the rough surface of new breaking.

The Chancellor variety made the thickest stand, and as it is a smaller seed than the others, it may have been drilled deeper. The vines were rather short as compared with those in 1922. The Early Feed, as in former tests, produced the largest quantity of straw. The following table gives the results for 1923, 1922, 1921 and a three-year average of grain yields. All were sown on one-fortieth-acre plots on breaking on April 26.

PEA—VARIETY TESTS

Name	Date Ripe	Days Maturing	Length of vine	Yield per acre			
				1923	1922	1921	3 year Average
			inches	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.
Champlain, Ottawa 32	Aug. 17	114	36	25 40	46 40	36 00	35 67
Arthur, Ottawa 18	" 17	114	34	19 20	45 20	35 20	33 20
Early Feed, Ottawa 30	" 14	111	37	24 20	43 20	30 00	32 33
Chancellor, Ottawa 27	" 14	111	33	26 00	40 00	26 40	30 53

FLAX

The season of 1923 was satisfactory for the flax crop. The yields were about average and there were no frosts before it was fully matured. Premost yielded more than Novelty, but was one day later in maturity. Premost is also slightly longer in the straw, and the seed is smaller.

FORAGE PLANTS

The season was only average for forage crops. Dry weather until the middle of June checked the growth of biennials and perennials, and caused a slow start among the roots, corn and sunflowers. An abundance of rain after the middle of June until early fall induced a record growth in all plants. The hay crop revived and yielded well three weeks later than usual, though the varieties on plots never wholly recovered. The resulting root crop was above normal, but the dry fall withered the sunflowers, reducing their yield and quality. Corn made an even growth throughout the season and yielded an average crop.

ANNUAL HAY CROPS

SWEET CLOVER FOR ANNUAL HAY

Three kinds of sweet clover were sown by five different methods in 1923 to be cut for annual hay. The white and yellow sweet clover as named in the following table, are biennial and do not bloom the first season. The hubam is an annual and completes its growth the year sown.

The hubam yielded twice as much fodder as the white and about four times as much as the yellow. There is no doubt that the hubam will give greater returns the first year, but as its production ends there, while the biennial varieties give their large returns the following year, it is doubtful whether its adoption is advisable. All were sown on May 24, and one plot of hubam left to ripen did not mature seed before it was frozen.

TEST OF SWEET CLOVERS

Name	Green weight per acre					Average per acre		
	Broadcast	6" Drills	24" Drills	30" Drills	36" Drills	Green	Air Dry	Oven Dry
	tons lbs.	tons lbs.	tons lbs.	tons lbs.	tons lbs.	tons lbs.	tons lbs.	tons lbs.
Hubam	5 1,240	5 1,140	5 1,320	6 760	5 580	5 1,480	1 1,778	1 1,175
White	2 1,880	2 800	2 1,180	3 640	2 1,580	2 1,616	1 320	0 1,949
Yellow	1 1,520	1 1,280	2 80	1 1,700	1 600	1 1,436	0 1,334	0 1,121

ANNUAL HAY CROPS

Three one-eightieth-acre plots each of eight varieties of oats were sown as a variety test for annual hay. The three plots of each variety were cut at three stages as follows: flowering, turning, and nearly ripe. The whole experiment was duplicated so that there were two plots under the same variety and treatment. The best feed was procured from the flowering stage cutting as the other two in all varieties excepting Daubeney and Alaska were badly rusted. From point of yield the nearly ripe cutting gave the best returns; but it is more inclined to shell with handling, and does not make such a succulent feed as either of the other.

As per table, Victory, Gold Rain and Banner yielded nearly alike, and should all make excellent feed if allowed to fill and produce a plump kernel, being very leafy. The yields from Daubeney and Alaska are rather low to be grown for feed.

Teff grass, an annual tried this year for the first time, gave a good yield of excellent hay, but was inclined to lodge, due to weak straw.

Feeder barley was also tested for this purpose and gave a fair yield of good feed. The straw will stay green until the grain is nearly ripe.

OATS AND OTHER ANNUAL HAY CROPS

Variety	Nearly Ripe		Turning		Flowering		Average					
							Green		Air Dry		Oven Dry	
	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.
Victory	12	808	11	1,720	10	120	11	907	3	1,221	3	67
Gold Rain	12	520	12	320	9	1,280	11	707	3	1,093	2	1,963
Banner	11	1,600	11	1,480	9	1,560	11	213	3	1,028	2	1,933
Longfellow	10	1,160	9	1,600	8	120	9	960	2	1,915	2	971
O.A.C. No. 72	11	120	11	240	7	1,320	9	1,893	2	1,833	2	904
Leader	8	1,120	8	1,200	7	80	8	133	2	936	2	149
Daubeney	7	680	7	480	5	80	6	1,080	2	432	1	1,725
Alaska	6	520	6	1,800	5	680	6	333	2	263	1	1,611
Teff Grass					14	1,200	14	1,200	3	1,504	3	304
Barley, Feeder			7	1,520			7	1,520	3	80	2	1,104

MISCELLANEOUS GRASSES AND CLOVERS

Eight varieties of grasses, and two selections of alfalfa were sown in 1921. All wintered well in 1922 and hay was cut from them as indicated in the following table. During the winter of 1922 and 1923, five of the grasses killed out totally, and the alfalfas were thinned to some extent. The winter in question was very severe on biennials and perennials, there being very little snow, and this coming and going several times during the winter. That they all wintered in 1921 and 1922 indicates, that when there is sufficient snow, they are all winter hardy. Severe winters are only survived by a few.

GRASSES AND CLOVERS

Name	1922		1923					
	Air dry		Air dry		Green		Oven dry	
	tons	lbs.	tons	lbs.	tons	lbs.	tons	lbs.
Brome	2	150	0	1,908	2	110	0	1,603
Western rye	1	1,700	0	1,732	1	1,090	0	1,455
Kentucky blue	0	1,600	0	530	0	960	0	445
Timothy	1	850	All winter-killed, 1923.					
Red Top	1	700						
Meadow fescue	1	1,350						
Tall oat grass	1	220						
Orchard grass	0	570						
Variegated alfalfa	1	1,620	0	665	1	40	0	559
Grimm alfalfa	1	470	0	680	1	–	0	572

SWEET CLOVER

The following table gives the results for common white and yellow blossom sweet clover sown in 1922 on one-tenth-acre plots, and also common white, and Arctic sweet clover, sown on one-sixty-eighth-acre plots. The stand in the fall of 1922 was very similar on all plots. All, except the Arctic, were killed back badly by the severe winter.

The large plots were broadcast and the small ones in rows 30 inches apart.

SWEET CLOVER YIELDS

Variety		Yields per acre					
		Green		Air dry		Oven dry	
		tons	lbs.	tons	lbs.	tons	lbs.
Yellow blossom sweet clover	1/10 acre	3	1,540	1	1,214	1	700
White blossom sweet clover	1/10 acre	4	70	1	670	1	243
Arctic sweet clover	1/68 acre	10	1,420	3	500	2	1,460
White blossom sweet clover	1/68 acre	4	840	1	652	1	230

Arctic sweet clover (left) proved perfectly hardy. Common white sweet clover (right) badly winter-killed.

ENSILAGE CROPS

SUNFLOWER

Fourteen types of sunflowers were sown in a comparative test on root land. Owing to some of the seed arriving late, five samples were sown a month after the others. Those sown later would not be accurately comparable with the early sown and allowance should be made accordingly. Some of the later types made a heavy growth; but due to dry weather early in the fall, they withered, and the lower leaves dropped off, making the green weight yields very low.

Manchurian, a multibranching type, gave the largest yield of green weight, while the single-stalked types as Russian Giant gave a higher yield of dry matter. As it is becoming more apparent in the minds of stockmen that fodder should be ensiled fairly dry to guard against freezing, dry matter rather than green weight will become more important. All were cut when 75 per cent in bloom, excepting the later varieties, which did not reach this stage.

Distance of Planting Sunflowers

Russian Giant sunflowers were planted in 6, 24, 30, and 36-inch drills, using a one-fortieth-acre plot for each experiment. The experiment was conducted in quadruplicate so that a four-plot average was used to get the final results. The 6-inch drills were sown by using all the runs in the drill as with grain. It was found that, excepting on the outside of the plots, they grew fine stalks and could be harvested with a grain binder. Precipitation was greater at this Station during the growing season this year than usual, and until we have tried it several years, we could not recommend this method of sowing.

As can be seen by the following table the 24-inch sowing gave the greatest yield in dry matter. All were sown and harvested on the same dates.

SUNFLOWERS—DISTANCE OF PLANTING

Distance of planting	Average Height	Green	Oven dry	Stage of maturity
	inch	tons lbs.	tons lbs.	
6 inch drills	73	17 880	3 1,780	6 per cent in bloom.
24-inch drills	83	16 252	4 836	30 per cent in bloom.
30-inch drills	92	16 1,100	3 1,084	42 per cent in bloom.
36-inch drills	96	14 1,052	3 1,000	48 per cent in bloom.

Date of Planting Sunflowers

Russian Giant sunflowers were sown at nine dates of one-week intervals, commencing on April 29. The green weight yields are very erratic due to the earlier sowings being very dry when cut. The oven dry yields give a more correct statement of growth and point to the same conclusion as we could draw from the same experiment in 1922. We would infer from the two years' results that the third week after work commences in spring is the best time to sow sunflowers.

The following table gives the yields from each sowing in green and absolute dry matter. All were harvested on September 5:—

DATE OF PLANTING SUNFLOWERS

Date sown	Average height	Yield per acre		Stage of maturity
		Green	Oven dry	
	inch	tons lbs.	tons lbs.	
April 19	90	13 1,324	3 415	70 per cent in bloom.
" 26	90	12 1,410	3 98	58 per cent in bloom.
May 3	88	14 1,634	3 970	60 per cent in bloom.
" 10	84	14 1,304	2 1,570	48 per cent in bloom.
" 17	84	14 842	2 1,016	39 per cent in bloom.
" 23	80	13 664	2 1,359	25 per cent in bloom.
" 31	80	13 862	2 1,161	12 per cent in bloom.
June 7	80	12 1,872	2 1,201	7 per cent in bloom.
" 14	69	9 414	1 1,630	In bud.

CORN

Varieties.—The season was very favourable for corn until September 12, when all varieties were frozen to the ground. Early fall frosts may be expected by the first of September and corn for ensilage purposes should be cut about this time.

The frosts we have in early September are, as a rule, of such a nature as not to harm the ear, and seed will ripen after the leaves have been nipped. This year the frost was so severe that the whole plant was frozen, and no ripe ears were picked from any variety. The yield of fodder was satisfactory, however, particularly from the later varieties.

CORN—VARIETY TESTS

Name of variety	Source	Average height	Green	Oven dry	Stage of maturity
		inch	tons lbs.	tons lbs.	
Comptons Early	J. O. Duke	78	17 1,200	2 1,808	Ears formed.
Longfellow	J. O. Duke	77	16 1,880	2 884	Ears formed.
North Western Red Dent	Dakota Improved Seed Co.	74	15 250	2 444	Early milk.
Longfellow	Steele Briggs	80	14 1,260	2 92	Ears formed.
Longfellow	Dakota Improved Seed Co.	77	14 600	2 59	Ears formed.
North Western Dent	McKenzie	65	14 215	2 1,137	Milk.
North Dakota	Steele Briggs	75	13 400	1 1,938	Ears formed.
Leaming	J. O. Duke	79	13 345	2 1,027	Ears formed.
Wisconsin No. 7	J. O. Duke	85	12 420	2 180	Ears formed.
Quebec 28	Macdonald College, Que.	66	11 1,100	2 202	Late milk.
Wisconsin No. 7	John Parks	76	11 990	1 1,542	Silked.
North Western Red Dent	Rosthern	60	10 1,670	2 136	Late milk.
Leaming	John Parks	78	10 1,175	1 1,938	Silked.
90 Day White Dent	Dakota Improved Seed Co.	80	10 1,120	1 1,025	Silked.
Golden Glow	J. O. Duke	79	10 75	1 1,113	Ears formed.
Disco Yellow Flint	Rosthern	57	9 1,525	1 1,729	Late milk.
White Cap Yellow Dent	Steele Briggs	80	9 1,195	1 937	Silked.
Yellow Dent	Dakota Improved Seed Co.	57	8 1,710	1 1,388	Late milk.
Twitchels Pride	E. F. Fredericton	57	8 720	1 1,190	Late milk.
Pride Yellow Dent	Dakota Improved Seed Co.	64	8 555	1 1,014	Milk.

Dates of Planting Corn.—Corn was sown at six dates of one week interval, commencing on April 23 and making the last sowing on May 31. The first sowing required 33 days to emerge while the last appeared in 9, which goes to show that if corn is sown too early it is in danger of rotting in the ground. The first sowing made rather a thin stand due very likely to this factor. However, as this is the first year of the experiment at this Station, we cannot draw any definite conclusions. Longfellow was used for all sowings and all were cut on the same date.

CORN—DATES OF SOWING

Date sown	Days emerging	Height	Yield per acre	
			Green	Oven dry
		inch	tons lbs.	tons lbs.
April 23	33	92	30 115	4 1,614
May 3	27	87	31 1,635	5 1,704
" 10	22	82	33 385	5 417
" 17	16	77	30 1,270	5 846
" 23	14	74	27 1,550	4 954
" 31	9	69	20 1,910	2 1,995

SWEDES

Twenty-five varieties or strains were tested on 66-foot rows in quadruplicate. All were sown on May 17 and pulled on October 15, thinned to 12 inches

and 30 inches between rows. All were as nearly as possible under the same conditions. Some of the lower-yielding varieties, as the white swedes, showed a tendency to grow largely to top and in a number of cases were not unlike rape. The following table gives the results of the six highest yielders this year:—

SWEDES—VARIETY TEST

Name of variety	Sources	Green	Oven dry
		tons lbs.	tons lbs.
Shepherds Swede 2056	Trifolium, Copenhagen, Denmark	27 1,242	2 1,993
Selected Westbury	Steele Briggs	27 912	2 1,755
Bangholm	MacKenzie	26 1,922	3 204
Purple Top	MacFayden	26 998	3 1,841
Ditmers Swede	H. H. McNutt	26 008	3 494
Bangholm Pajbjerg 7022	Trifolium, Copenhagen, Denmark	25 1,546	3 1,946

Distance of Thinning Swedes

Sixteen rows of Hall's Westbury swede turnips were sown on May 17. On June 18 they were thinned to 6, 12, 18, and 24 inches, using two rows for each experiment and duplicating. The resulting yields when pulled on October 16 are given in the following table.

The same experiment, with the exclusion of 24-inch thinning, had been carried on in 1921 and 1922 and these results are also tabulated. From a three-year average we would infer that twelve-inch thinning is the most profitable.

SWEDES—DISTANCE OF THINNING

Distance of thinning	1923	1922	1921	Three-year average
	tons lbs.	tons lbs.	tons lbs.	tons lbs.
6 inches	22 154	22 1,802	18 352	21 103
12 inches	21 1,824	25 1,461	20 576	22 1,287
18 inches	20 1,646	24 1,325	20 1,728	22 233
24 inches	22 1,144	.....	.....	.....

ROOTS

CARROTS

The variety test of carrots showed White Half Long and Danish Champion leading with 1,874 pounds (oven dry). The Improved Half Long White took third place with oven dry yield of 1,848 pounds.

SUGAR BEETS

Five varieties of sugar beets and four of sugar mangels were under test. The sugar mangels yielded much more in green weight than the sugar beets; but the latter contained about double the percentage of dry matter.

SUGAR BEETS—TEST OF VARIETIES

Sugar Beets	Source	Green	Oven dry	Per cent sugar in juice
		tons lbs.	tons lbs.	
Vilmorin's B	Vilmorin Andrieux, Paris, France	18 1,092	3 1,894	11·54
Hemming's and Harvings, Denmark	Dominion Sugar Company	14 1,974	2 1,808	12·68
Chatham	Dominion Sugar Company	14 1,238	3 705	12·79
Kitchener	Dominion Sugar Company	13 1,126	2 1,306	14·45
Sluice Brothers, Holland	Dominion Sugar Company	12 1,608	3 19	14·19

FALL TURNIPS

Eighteen varieties of fall turnips were under test but did not yield in accordance with the season. This may have been partly due to sowing rather late—on June 6. Al varieties were harvested on September 22 and appeared to be well matured. Many were over-ripe and beginning to decompose.

In 1922, Red Paragon yielded over 33 tons, while this year the yield was slightly over 18 tons. The yield in green and oven-dried state are given in the following table for the six highest yielding varieties.

Name of variety	Source	Yield per acre	
		Green	Oven dry
		tons lbs.	tons lbs.
Fynsk Bortfielder	Hjalmar Hartmann & Co., Copenhagen, Denmark	21 768	1 1,821
Red Paragon	Sutton	18 696	1 350
Purple Top Mammoth	Sutton	18 696	1 1,168
White Globe	Ewing	18 168	1 1,036
Purple Top Aberdeen	Sutton	17 584	1 1,432
Pomeranian White Globe	Steele Briggs	16 1,792	1 1,406

Dates of Sowing Fall Turnips

Fall turnips do not keep well in storage and should only be grown where succulent feed of this nature is required for fall and early winter feeding of stock. They should be sown only early enough to allow them to complete their growth when required for feed, as they decompose very quickly if left in the ground after they are mature. In 1923, they required about 122 days to reach maturity.

Purple Top Mammoth fall turnips were sown at eight dates of one-week intervals, commencing on May 17. All were harvested on October 5, and at that date many in the earlier sowings had begun to decompose.

FALL TURNIPS—DATES OF SOWING

Date sown	Yield per acre		Remarks
	Green	Oven dry	
	tons lbs.	tons lbs.	
May 17	17 254	1 1,211	20 per cent decomposed.
" 25	19 1,732	1 1,564	14 per cent decomposed.
" 31	17 254	1 930	12 per cent decomposed.
June 7	16 802	1 825	10 per cent decomposed.
" 14	10 1,846	0 1,716	4 per cent decomposed.
" 23	9 744	0 1,690	3·5 per cent decomposed.
" 28	7 1,708	0 1,399	2 per cent decomposed.
July 5	3 534	0 634	

MANGELS

Twenty varieties of mangels were tested on summer-fallow with excellent results. All were sown on May 17 and harvested on October 10. A severe frost on September 12 froze the tops but did not injure the roots which produced new tops within two weeks. The yields of the six highest varieties are taken from one 66-foot row in quadruplicate.

MANGELS—TEST OF VARIETIES

Name of variety	Source	Yield per acre			
		Green weight		Oven dry weight	
		tons	lbs.	tons	lbs.
Eclipse	MacKenzie	38	494	2	1,702
Barres Sludstrup 3084	Trifolium, Copenhagen, Denmark	36	732	3	679
New Ideal	Steele Briggs	37	732	3	890
Devon Yellow Globe	Sutton	36	72	2	1,201
Monarch Sugar	McKenzie	25	1,874	2	1,914
Barres Sludstrup 752	Danish Farmers Seed Ass., Roskilde, Denmark	35	422	3	917

Dates of Sowing Mangels.—Three varieties of mangels were sown at three dates of ten days interval; soaked and dry seed of each variety at each date. The soaked seed was immersed in water for twenty-four hours before sowing.

Apparently seed should be soaked for a longer period than 24 hours to penetrate the hard covering of a mangel seed, as the soaked seed in this case did not germinate any more quickly than the dry. The soaked seed should also be allowed to dry for several hours before sowing as otherwise it will not feed through the seeder. Early seeding gave greater yields in nearly all cases.

POULTRY

Barred Plymouth Rocks are kept on this Station as being one of the breeds most popular in the district and one most able to stand a northern climate. When careful breeding and culling is carried on, this variety stands up well in egg production, especially at the time when egg prices are at their highest. The dressed bird when properly finished will quite readily command the top price on the market.

Attention can be drawn to the fact that birds from this Station which were finished to conform to market requirements brought 22 cents per pound, while local birds of mixed breeding with no uniformity in size or shape and poorly finished were a drug on the market at 16 cents per pound.

The birds are housed in permanent poultry houses 16 by 32 feet, and portable colony houses 10 by 12 feet. The permanent houses hold 100 birds each and are divided by a partition, each half containing fifty birds. If necessary, these may be again divided to make pens for smaller matings. This type of building is proving satisfactory as it is easy to regulate sunlight or fresh air by adjusting the cotton fronts on the windows, making conditions satisfactory for the flock at any time of the year. It is built on a concrete foundation with a concrete floor, and if placed on land with good drainage, there should be no trouble from dampness. The roof is double pitched, and a ceiling is put in under the plates, composed of four-inch slats placed one inch apart and the whole space above the ceiling is then filled with dry, clean straw. This, combined with the cotton window fronts, provides as nearly ideal ventilation conditions as is possible to procure in our varied climate. Any surplus moisture arising filters through the ceiling, and is carried off above the straw through small doors cut in each gable.

A cooler temperature is also obtained than from a building with bare roof exposed to the sun in the hot summer months.

The colony houses are shanty-roofed with board floors, and are especially useful for summer when the birds are out on range. They are built on runners, and can be easily moved anywhere on the farm, providing clean ground for the stock to range over. For winter use, they are banked up from the ground on

four sides with stable manure, and if frost gathers on the ceiling, about a foot of straw may be spread over the roof and weighed down with poles. The chief thing to recommend this house is its cheapness and simplicity of construction.

The experimental work carried on is along the lines of housing, breeding, feeding and general management of poultry. The work of establishing pedigree records which was commenced in 1922 has been continued, and while this phase of the work has only been carried on for two years, the mating of males from parents of high egg production with our best females has already made a marked improvement in average and individual egg production. Two pullets whose dam produced 150 eggs gave us records of 207 and 203 eggs.

In flock production, taking fifteen of the best layers for the two years, 1922 and 1923, the average was increased from 132 eggs per bird in 1922 to 151 eggs per bird in 1923.

Early hatched, well-matured pullets are the most dependable layers during the fall and early winter months. These are placed in their winter quarters by late September or early October before they begin to lay. Some of the yearling hens may continue to lay during moulting period, but from records kept, it has been shown that they do little towards egg production until the moult is completed, or until January or later.

EGGS FOR HATCHING

Eggs from hens usually give better results than pullet eggs for hatching; but while they gave a higher percentage of fertility, the eggs from the pullets which were fertile, hatched out better, and fewer fertile eggs were required to produce one chick alive three weeks after hatching.

Hatching results from eggs set in March, April, and May compare favourably with those obtained last year, in that eggs set in May gave higher fertility, a higher percentage hatched, and more of the chicks survived the danger period until three weeks old. It took less than half the number of eggs of the late settings to produce a live chick at three weeks old than it did of the earlier settings.

In comparing these differences, we must admit that a number of factors may enter into influence the results, as no doubt close confinement, climatic conditions, and a short working day for the stock throughout the winter months, combine to affect the fertility of the eggs, the vitality of the germ, and the viability of the chick.

CRATE FATTENING

Excellent results have been obtained at Rosthern by crate-fattening poultry, feeding all the birds on soft mashes. Three or four weeks' feeding in crates adds weight and finish to the birds economically, and produces a plump carcass in the best possible shape for human consumption.

A comparison of several mash mixtures for crate-fattening poultry has been made, and the results show that in considering the cost of the different grains used, and the ease in procuring them, a mixture of equal parts of barley meal and oat meal is the best. Twenty-four cockerels were weighed and divided into four lots, eighteen placed in crates and six allowed out on free range. The period of the experiment was twenty-one days. Those in crates on pea meal, oat meal and milk, gained 8.8 pounds, at a cost of 11 cents per pound. Those in crates on corn meal, oat meal and milk, made a gain of 11 pounds, at a cost of 6·2 cents per pound. The lot in crates on barley meal, oat meal and milk made 11.8 pounds gain, at a cost of 5.3 cents per pound and those on free range gained 11.1 pounds at an average cost of 7 cents per pound.

TURKEYS

A start was made with Mammoth Bronze turkeys in 1922 with the purchase of four hens and one gobbler. These were housed in a colony house, and only in cold stormy weather were the cotton fronts on the windows closed down. Grain feed was scattered on the ground morning and evening, the object being to encourage the birds to stay out in the open as much as possible. As the young hens were late in commencing to lay, only one nest of eggs each was hatched out. The four hens were set in barrels placed in quiet corners round the plant. Out of the 64 eggs set, four were infertile, and three contained dead poults in the shell. The fifty-seven hatched were divided between the four hens and put out in roomy "A" shaped coops with a three foot movable wire fence surrounding them. A varied menu of hard boiled eggs with the shells on, and dried bread run through a grinder, milk curds, oat meal and shorts were fed at intervals, five times a day. Green feed was given them in the shape of lettuce and dandelion leaves, onion tops or cabbage sprouts. As the birds grew older, the egg and dry bread crumbs were replaced by cracked wheat and barley and hulless oats. While fresh water was accessible to them at all times, they were encouraged to drink skim-milk.

The young birds were examined often for lice, especially head lice which cause great havoc amongst young turkeys. The hens were dusted twice with dry sulphur while setting, and the young birds were treated with a light dusting when about a week old. A small portion of the sulphur was mixed with lard and rubbed on their heads. When about a month old, after they were large enough to fly over the fence, they were given their liberty. Up to this time there had been a mortality of seven poults through trampling and other causes. No further losses occurred after they got running at large, and the fifty birds in the fall were well grown and in fine shape for fattening.

Several weeks before they were disposed of, they were fed a fattening mash of equal parts of hulless oats and barley meal, shorts, and a fifth part of beef scrap, mixed with skim-milk. They were given all they would clean up twice a day. They were killed by bleeding through the mouth, and dry picked, the larger birds being sent to market while the smaller ones were disposed of locally. A number were sold for breeders.

BEES

The start in bees began in 1923 with two hives of Italian bees which were sent from the Dominion Experimental Farm, Ottawa. They arrived on May 19, and when examined one hive was in splendid condition, but the other had a number of dead bees. The Experimental Station will test the district as a honey producing section.

As the early flowering shrubs did not commence to bloom until the last of May there was practically no nectar-secreting plants throughout the month. June was decidedly unfavourable for honey production having an unusually heavy rainfall of 3.59 inches and only 251.0 hours of sunshine compared with 348.3 for May of the same year. Apart from this there were many cold raw windy days with a minimum temperature for the month of 41 degrees. July and August were much more favourable for the gathering of nectar and pollen, having 317.0 and 284.6 hours of sunshine respectively with a total precipitation of 6.19 inches.

The early sources of honey were principally from caragana, lilacs, fruit-blossoms and other flowering shrubs. Throughout July and August the bees were noticed working among the clovers, alfalfa, sunflowers and flora of the prairie. On September 21 eleven degrees of frost cut off all sources of nectar, with the result that there was practically no fall honey flow. Though the season

seems short, yet the long days during the summer months appear to be conducive to a heavy honey flow, as it was during part of July that one colony showed an average increase of two pounds daily. From the two colonies 126 pounds of extracted honey were taken, the best colony yielding 95 pounds.

During the summer, the apiary increased by two colonies. These nuclei lacked in stores but otherwise were in good condition by September 15. Sugar syrup consisting of two parts of sugar and one of water was fed to each of the four colonies from September 21 to October 12. As feeders, a ten-pound honey pail having the lid perforated with a number of small holes gave better satisfaction than the "Miller" feeder. The syrup was fed into the hive until the hive and its contents weighed on an average of 74 pounds. In addition four frames of honey were stored away for spring feeding as this is the natural food for the rearing of brood.

To determine the most suitable method of wintering bees in this district, two colonies were prepared for wintering outdoors, and two others were placed in the cellar of a dwelling house. The outdoor wintering case was constructed sufficiently large to accomodate two of the standard ten-frame Langstroth hives and allow for nine inches of packing on four sides, eight inches on the bottom, twelve inches on the top and three inches between the hives. The floor and sides of the case were constructed of grooved and tongued boards and the roof fitted snugly over the sides. Flight holes eight inches wide and one inch high were cut in the side of the case directly opposite the entrances of the hives. In winter this opening is reduced to one inch by three-eighths of an inch by a revolving block which is attached with a screw at one side of the opening. A bridge, the full width of the hive with a five-eighths inch passage, connects the flight holes of the hives with the flight holes that have been made in the case.

Previous to packing the outdoor hives for the winter, the covers were replaced by empty shallow supers leaving the quilts on top of the frames. Four or five layers of sacking were arranged within each of the supers, and the whole case firmly packed with oat and barley chaff. On October 29 two hives were taken into the cellar. The covers were removed, leaving on the quilts under which sticks were placed to provide passages for the bees over the combs. Three or four thicknesses of sacking were then spread over the top of the hives to allow any moisture that may be present in the hives to escape. The cellar is dark and a temperature of 40 to 45 degrees is maintained.

EXPERIMENTAL PROJECTS UNDER WAY AT THE EXPERIMENTAL STATION, ROSTHERN, SASK.

ANIMAL HUSBANDRY

DAIRY CATTLE

Project No.	Title.
A. 59.	Cost of rearing dairy-bred calves and heifers.
A. 216.	Establishing herds of dairy cattle.

BEEF CATTLE

A. 171.	Roots vs. Ensilage for steers.
A. 172.	Winter feeding of steers.
A. 175.	Value of meal for steer feeding.
A. 179.	Comparison of steers of different ages.

HORSES

A. 340.	Control of naval ill in foals.

SHEEP

A. 305.	Goitre in lambs.
A. 310.	Grading up the flock with purebred rams.
A. 328.	Breeding as ewe lambs vs. breeding as shearling ewes.

SWINE

A. 120.	Self-feeding vs. trough feeding of swine.
A. 163.	Cost of pork production.
A. 234.	Establishing a herd of Berkshire swine.
A. 341.	Elevator screenings vs. oats and barley for hogs.

FIELD HUSBANDRY

ROTATION EXPERIMENTS

F. 107.	Three-year rotation—Summer-fallow; wheat; wheat.
F. 118.	Five-year rotation—Summer-fallow; winter rye; wheat; oats; barley.
F. 122.	Six-year rotation—Summer-fallow; wheat; wheat; oats; hay; hay.
F. 136.	Eight-year rotation—Summer-fallow; wheat; wheat; summer-fallow; turnips; barley; hay; pasture.
F. 136.	Nine-year rotation—Summer-fallow; corn, wheat, oats; summer-fallow; wheat; oats; hay; pasture.

CULTURAL EXPERIMENTS

F. 148.	Depth of Ploughing.

MANURE AND COMMERCIAL FERTILIZER EXPERIMENTS

F. 193.	Commercial fertilizers for field crops.

FARM MANAGEMENT EXPERIMENTS

F. 195.	Cost of producing farm crops.
F. 196.	Cost of operating tractor.

HORTICULTURE

SMALL FRUITS

H. 4.	Currant, Variety Experiment.
H. 6.	Gooseberry, Variety Experiment.
H. 11.	Raspberry, Variety Experiment.
H. 15.	Strawberry, Growing Commercially.
H. 12.	Strawberry, Spring vs. Autumn Planting.
H. 21.	Strawberry, Variety Experiment.

Project No.	Title.
	TREE FRUITS
H. 23.	Apple Breeding for the Prairie Provinces.
H. 33.	Apple Variety Experiment.
H. 34.	Cherry, Breeding.
H. 35.	Cherry, Variety Experiment.
H. 45.	Plum, Breeding.
H. 48.	Plum, Variety Experiment.
	VEGETABLE GARDENING
H. 51.	Artichokes, Variety Experiment.
H. 54.	Asparagus, Variety Experiment.
H. 57.	Bean of Different Seasons vs. one variety planted at different dates.
H. 61.	Bean, Variety Experiment.
H. 67.	Beet, Thinning Experiment.
H. 68.	Beet, Variety Experiment.
H. 70.	Brussels Sprouts, Variety Experiments.
H. 77.	Cabbage, Variety Experiment.
H. 82.	Carrot, Thinning Experiment.
H. 83.	Carrot, Variety Experiment.
H. 84.	Cauliflower, Hot-bed vs. outside sowing.
H. 88.	Cauliflower, Variety Experiment.
H. 91.	Celery, Irrigated vs. Non-irrigated.
H. 94.	Celery, Variety Experiment.
H. 309.	Citron, Variety Experiment.
H. 99.	Corn, Hot-bed vs. Sown in the open.
H. 102.	Corn, Variety Experiment.
H. 106.	Cucumber, Variety Experiment.
H. 110.	Kohl Rabi, Variety Experiment.
H. 111.	Leek, Hot-bed vs. Sown in the open.
H. 116.	Lettuce, Variety Experiment.
H. 117.	Market Garden Experiment.
H. 122.	Melon, Musk, Variety Experiment.
H. 125.	Melon, Water, Variety Experiment.
H. 138.	Onion, Variety Experiment.
H. 140.	Parsley, Variety Experiment.
H. 144.	Parsnip, Thinning Experiment.
H. 145.	Parsnip, Variety Experiment.
H. 150.	Pea, of Different Seasons, vs. one Variety planted at Different dates.
H. 153.	Pea, Variety Experiment.
H. 157.	Pepper, Variety Experiment.
H. 163.	Potato, Different Depths of Planting.
H. 174.	Potato, Home Grown vs. Northern or Eastern Seed.
H. 186.	Potato, Variety Experiment.
H. 188.	Pumpkin, Variety Experiment.
H. 192.	Radish, Variety Experiment.
H. 195.	Rhubarb, Variety Experiment.
H. 197.	Salsify, Variety Experiment.
H. 199.	Spinach, Variety Experiment.
H. 201.	Squash, Variety Experiment.
H. 203.	Swiss Chard, Variety Experiment.
H. 205.	Tomato, Distances of Planting.
H. 207.	Tomato, Methods of Training.
H. 210.	Tomato, Transplanting, one or more times.
H. 211.	Tomato, Variety Experiment.
H. 214.	Turnip, Variety Experiment.
H. 215.	Vegetable Crop Rotation.
	TREES AND SHRUBS
H. 307.	Ornamental and Shelter, Variety Experiment.

CEREALS

Ce. 1. Common Spring Wheats; 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. 18. Mangels, Seed Treatment to increase germination.
Ag. 20. Mangels, Early vs. late seeding fodder.
Ag. 36. Carrots, Variety tests for yield and purity.
Ag. 46. Turnips, Variety tests for yield and purity.
Ag. 47. Early vs. late seeding.
Ag. 51. Swedes, Variety tests for yield and purity.
Ag. 60. Swedes, Rates of planting.
Ag. 66. Sugar Beets, Variety tests for yield and purity.
Ag. 76. Sunflowers, Variety tests for yield and purity.
Ag. 126. Alfalfa, Variety tests hardiness yield suitability.
Ag. 129. Alfalfa, Broadcast vs. rows for hay production.
Ag. 130. Alfalfa, Broadcast vs. rows for seed production.
Ag. 131. Alfalfa, Rates of seeding for hay production.
Ag. 132. Alfalfa, Rates of seeding 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.
Ag. 161. Sweet Clover, Variety tests.
Ag. 162. Sweet Clover, Methods of seeding for hay production.
Ag. 163. Sweet Clover, Rates of seeding for hay production.
Ag. 164. Sweet Clover, Methods of seeding for seed production.
Ag. 165. Sweet Clover, Rates of seeding for seed production.
Ag. 166. Sweet Clover, Seeding with vs. without a nurse crop for seed production.
Ag. 212. Brome Grass, Rates of seeding for hay production.
Ag. 214. Brome Grass, Rates of seeding for seed production.
Ag. 221. Western Rye, Variety tests for yield and purity.
Ag. 222. Western Rye, Methods of seeding for hay production.
Ag. 224. Western Rye, Methods of seeding for seed production.
Ag. 241. Annual Hay Crops, Variety tests for yield and suitability.
(*a*) Grain varieties, Variety tests for yield and suitability.
(*b*) Legume varieties, Variety tests for yield and suitability.
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Ag. 242. Annual Hay Crops, Dates of seeding.
Ag. 245. Annual Hay Crops, Time of harvesting.
Ag. 255. Miscellaneous grasses, variety tests.
Ag. 256. Miscellaneous legumes, variety tests.

CHEMISTRY

C. 10. Sugar Beet Investigation.
C. 11. Agricultural Meteorology.

APICULTURE

Ap. 20. Returns from apiaries.