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 1922

Herd of Holsteins in 1922 from a start of 2 calves in 1914.—Rosthern.

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PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1923

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EXPERIMENTAL STATION, ROSTHERN, SASKATCHEWAN

Report of the Superintendent, W. A. MUNRO, B.A., B.S.A.

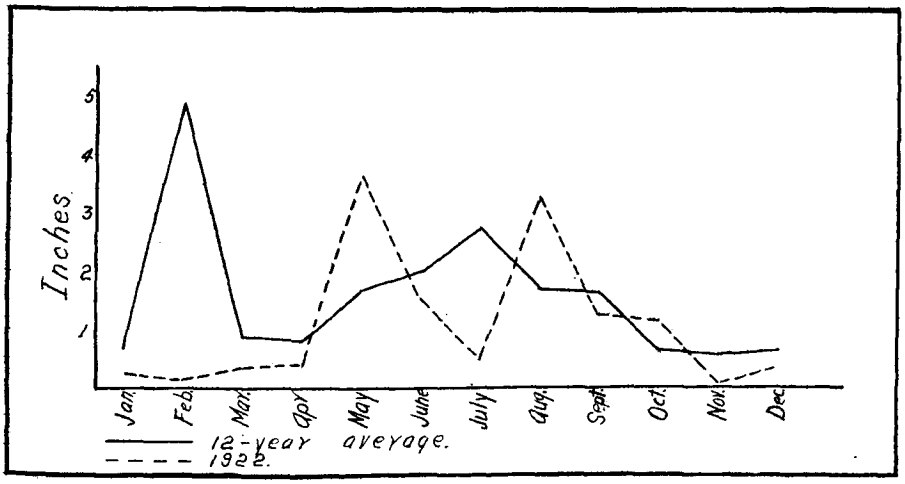
SEASONAL NOTES

A total precipitation of 1·20 inches fell during the months of January, February, March and April as compared with a 12-year average of 7·28 inches for the same months in 1911-22. The lowest temperature recorded in the same four months was 45 degrees F. on January 22.

The crop season opened rather earlier than usual. Seeding commenced on the Station on April 24 and was general in the district by the 27th.

The 3·66 inches of moisture which fell in May, as compared with the 12-year average precipitation for 1911-22 of 1·68 inches, was well distributed throughout the month. This, combined with a mean temperature of 53·9 degrees F. and a minimum of 32·9 degrees F. for the month, assured excellent germination and early growth.

Graph showing the total monthly precipitation for 1922 and the 12-year average for 1911 to 1922.



Although well distributed throughout the month, the rainfall in June was lighter than usual, i.e., 1·54 inches, compared with a 12-year average 1911-22 of 2·02 inches. This, together with the almost entire lack of precipitation in July, ·53 inches as compared with a 12-year average of 2·73 inches, checked growth greatly and prospects of heavy grain and garden crops were discouraging.

However, a timely fall of 2·25 inches of rain from August 5 to 10 and ·76 inches on August 16, with a total of 3·28 inches for the month, resulted in more than average yields.

A larger crop of hay than has been cut on this Station since 1914 was gathered in under ideal weather conditions.

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A temperature of 30·0 degrees F. was recorded on the Station on September 9 but it did not injure the tender vegetables. The first killing frost was not until September 15.

Conditions which facilitated the completion of threshing on the Station by September 23 and the late date at which the ground was frozen contributed to more fall ploughing being done this year than has been done for several years.

While snow flurries were recorded in October, November and December, there was not sufficient snow for sleighing until December 25.

WEATHER OBSERVATIONS TAKEN AT ROSTHERN EXPERIMENTAL STATION—1922

Month	Highest	Lowest	Mean	Precipitation 1922	Precipitation 12-year average 1911–1922	Sunshine
1922	Deg. F.	Deg. F.	Deg. F.	Inches	Inches	Hours
January	36·6	−45·0	−11·78	0·25	0·71	97·8
February	22·6	−38·9	−17·05	0·16	4·86	153·8
March	42·3	−20·1	5·30	0·35	0·88	142·7
April	69·9	8·2	29·85	0·44	0·83	187·8
May	87·0	32·9	43·69	3·66	1·68	254·7
June	87·0	34·9	47·60	1·54	2·02	324·5
July	90·2	38·5	48·34	0·53	2·73	386·1
August	97·0	37·5	51·47	3·28	1·73	257·9
September	87·8	27·4	40·39	1·31	1·67	226·2
October	65·5	22·5	30·79	1·19	0·66	143·4
November	50·6	−5·0	19·11	0·05	0·59	130·7
December	34·1	−30·1	−7·72	0·35	0·61	84·2
Total				13·11	18·97	2,389·8

Total precipitation for five growing months—April to August, 9·45 inches.
2 year average precipitation for five growing months, April to August 1911-1922, 9·18 inches.

ANIMAL HUSBANDRY

HORSES

The work-horses on the Station were augmented by two three-year-old colts which were brought into service, and decreased by one which died of what was diagnosed as a blood clot and one which died of colic.

In 1921 there were three colts and one mature mare died of swamp fever. Swamp fever is a rather indefinite term which is apparently applied to any of several diseases. In any case these horses lost appetite, lost flesh, swelled on the under side of the body and were anæmic. The symptoms lasted from two weeks to four months. In 1922 there were no horses showing any of these symptoms. It is worthy of note that in 1921 the colts and a few of the mature horses were allowed the run of a pasture in which there was a slough, whereas, in 1922, none of the horses was allowed near a slough and they were not fed slough hay. This, as well as outside observations, tends to confirm the opinion that so-called swamp fever in certain districts is always associated with horses that have had access to sloughs or have been fed slough hay.

WINTERING HORSES

Even on the best regulated farms there is more work for the horses in summer than in winter, which implies that some horses must pay for their board during the winter out of their summer's work. In the more recently settled

districts where there is plenty of land that has not been closely pastured during the summer, the horses may be turned out in the early autumn and left till spring. They return in the spring with shaggy coats and perhaps a little thin in flesh but they are invariably in splendid condition to begin work. It is quite impossible to adopt this method in districts where there is no winter pasture, but a modification of this method has been used for several years at the Experimental Station.

Horses require food, exercise and fresh air. They evidently do not suffer from low temperatures, if provided with these requisites. The idle horses at the Station are fed in the morning half a gallon of oats and bran, and what good oat straw or hay they will eat up clean in half an hour, then watered and turned out into a large field for the day. In the evening they are brought in, watered, and fed half a gallon of oats and bran and as much good oat straw or hay as they will eat up clean before morning. The stable is not warm, but is dry and well ventilated. Horses wintered in this way are invariably in good condition to begin work in the spring.

No blankets have been used on any of the horses on the Station for the past seven years, and during that time there has not been a horse sick with a cold.

BEEF CATTLE

There are no beef cattle kept at the Rosthern Station for breeding purposes; however, with the exception of the winter 1919, steers have been purchased every autumn for the past eight years, fed during the winter and sold in the spring, and in every case, except the spring of 1921, were sold at a considerable profit after allowing highest market value for feed consumed. Twice the cattle were purchased directly from the farmers and five times from dealers and in all cases the cattle came from districts where oats and barley yield well and in most cases where prairie hay may be had at much lower cost than prevails at Rosthern. In the cases where they were purchased from dealers there was one profit lost between the grower and the feeder. If feeding under such circumstances can be done profitably how much greater would be its advantage to the live-stock grower.

Feeding cattle in winter:—

1. Furnishes interesting employment when wages are low.
2. Disposes of rough feed such as oat straw, barley straw, screenings.
3. Utilizes wheat straw as bedding and returns fertilizer to the land.
4. Turns over at a good profit everything used including hay, straw and grain as well as the cattle themselves.

In the winter of 1921-22 an experiment was conducted to compare the feeding values of turnips and ensilage. Three lots of steers were in the experiment, all of which were fed mixed oat and barley meal, oat straw and hay, at the same rate per weight of steer and in addition lots 1 and 2 were fed sunflower ensilage at the rate of 20 pounds per 1,000 pounds of steer and lot 3 was fed turnips at the same rate. After the first month the ensilage and turnips were increased to 30 pounds. On April 3 ensilage and turnips were stopped and hay was added to the ration and on May 18 the cattle were weighed and shipped to Winnipeg.

Following is a statement of the results:—

STEER FEEDING EXPERIMENT

	Lot 1	Lot 2	Lot 3
Number of steers in experiment	20	20	20
Number of days in experiment	166	166	166
Total weight at beginning—pounds	22,260	19,510	22,690
Total weight at end—pounds	27,130	24,190	27,320
Gain during the period—pounds	4,870	4,680	4,630
Gain per head—pounds	243·5	234	231·1
Daily gain per head—pounds	1·47	1·41	1·39
Feed consumed—			
Barley chop—pounds	22,793	19,838	22,694
Oat chop—pounds	13,463	11,758	13,548
Ensilage—tons	37½	32½	
Turnips—tons			38
Hay—tons	2	2	2
Oat sheaves—tons	1	1	1
Straw—tons	15	15	15

Assuming meal to be worth one cent per pound, ensilage and turnips $5 per ton, hay and oat sheaves $12 per ton and straw $2 per ton, the statement of cost and return follows:—

	Lot 1	Lot 2	Lot 3
	$ cts.	$ cts.	$ cts.
Initial cost	891 45	781 30	908 65
Feed	616 10	544 46	618 42
Total cost	1,507 55	1,325 76	1,527 07
Net returns	1,727 48	1,540 38	1,739 70
Profits	219 93	214 62	212 63

The deduction from this one experiment is that turnip and sunflower ensilage have feeding values nearly equal when fed in conjunction with a full meal ration.

SHRINKAGE

Sixty steers were weighed at the corrals and shipped to Winnipeg, fed and watered en route, and weighed, after being fed and watered, at Winnipeg. Following is the statement of shrinkage:—

	Pounds
60 steers, Rosthern weight	78,640
60 steers, Winnipeg weight	74,340
Shrinkage	4,300
Shrinkage per steer	71·6

The greatest shrinkage ever experienced before, either to or from this Station, was 57 pounds per steer.

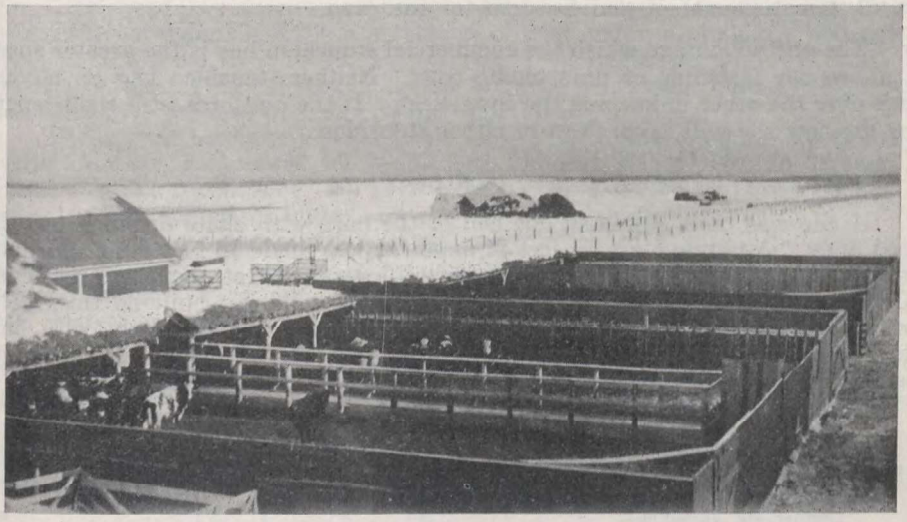
WINNIPEG VS. ROSTHERN VALUES

	Per cwt.
Average gross price at Winnipeg	$ 7 35
Average net price at Winnipeg	6 77
Average net price as per Rosthern weight	6 37

This statement means that same amount would have been realized by taking $6.37 at Rosthern on the Rosthern weights as by undergoing the expense of shipping to Winnipeg and taking $7.35 at Winnipeg on the Winnipeg weights.

ACCOMMODATION FOR WINTER FEEDING

Winter feeding of steers has always been carried on at this Station in corrals, each 40 feet by 80 feet, enclosed by an 8-foot fence and covered at one end for a length of 20 feet with poles and straw. Preceding is a drawing of four such corrals arranged in two pairs opening into a common lane. One pair is joined to a feed room and silo.



Steer Feeding Corrals.—Rosthern.

Apart from the feeding there seems to be two essentials necessary for maximum gains. One essential is available water at all times during the day. This is provided by means of a cast-iron heater in a large tank of water. The other essential is clean, dry sleeping quarters. If the part of the corral under the shelter be cleaned out at least three times per week and provided with fresh straw the cattle will not lie down anywhere else.

DAIRY BARN

A new dairy barn 50 feet by 36 feet was completed during the past season. This is arranged with a feed alley down the middle with the two rows of cattle facing each other with accommodation for twelve cows on one side and six cows and three box-stalls on the other.

The length of 5 feet 2 inches for the platform is adequate for cows weighing about 1,200 pounds but for larger cows such as Shorthorns or Holsteins weighing 1,600 pounds a platform 4 inches longer is more satisfactory. A length of 5 feet is sufficient for two-year-old Holstein heifers.

The stanchions are home-made throughout, the uprights being old steam-boiler flues and the top rail a length of 2-inch water pipe. The cows are tied with chains. Each upright is filled with concrete and a bolt imbedded in the end. In those uprights to which the cattle are tied the bolts are long enough to extend merely enough to reach through the shell of the top rail. A similar arrangement can be made by using well seasoned spruce or tamarac

poles for the uprights and two thicknesses of 2- by 6-inch planks for the top rail. Stanchions like these were used for six years in one side of the old stable on the Station and on the other side were the ordinary stanchions as put out by several manufacturers.

The advantages of the home-made stanchions are:—

1. Low cost.
2. Greater durability.
3. Greater comfort and freedom for the cows.

The one advantage which the commercial stanchion has is the greater speed it allows for fastening or unfastening cows. Neither stanchion had an advantage over the other in keeping the cows clean. If the platform is of right length for the cow she will keep clean in either stanchion.

SILO

A silo was built adjoining one end of the barn with chute opening into the feed alley. An excavation 15 feet in diameter was made 16 feet deep and lined with 6 inches of cement. The concrete wall extends 2 feet above ground level. A stave silo of 14 feet diameter and 14 feet in height was built on this. The whole silo as it stands is 14 feet in diameter and 32 feet in height with half its height under ground. It was filled with 155 tons of silage, but no report can be made on its efficiency until it is emptied.,

Statement of cost of silo is as follows:—

	$ cts.
Concrete, including—	
73 sacks cement at $1.22	89 06
89 yards gravel at $2.60	231 40
Lumber, etc., including—	
94 pieces 2 x 6—16	54 05
Material for roof, nails, window, etc.	42 60
Iron rods and lugs	43 75
Creosote	3 35
Labour in excavating, cement work and carpenter work	115 25
Total cost	579 46

The lumber was slightly bevelled with a hand plane and painted with creosote.

THE DAIRY HERD

This herd, which consists of 20 females, is being developed from a start of two heifer calves, May Flower Sylvia, No. 28018, and Bonnieview Gypsy Keyes, No. 30689, purchased in the spring of 1914. They were from stock of no outstanding merit as producers except that the dam of the former had a yearly record of 9,594 pounds of milk and 373 pounds of fat as a two-year-old. The first two bulls used were the only ones obtainable in the district at the time and neither of them had any record backing. However, one of them, Sir Madrigal de Kol, No. 26590, proved to be a surprisingly good breeding bull. Unfortunately, this fact was not recognized until his daughter, "R. E. S. Madrigal Gypsy Keyes," was four years old, at which time she completed a record of 18,522 pounds of milk. By that time he had been disposed of.

The first bull owned by the Station was Sir Johanna Pontiac of Ottawa, No. 27263, bred at the Central Experimental Farm, Ottawa, sired by Sir Johanna Ormsby of Hickory, No. 18811, whose dam had a record of 22,159 pounds of milk and 971 pounds of butter in a year, and out of Pontiac Belle of Manor,

No. 24497, with a record of 21 pounds butter in 7 days, and giving 13,921 pounds milk and 653 pounds butter in 319 days as a three-year-old. She in turn was sired by a grandson of King of the Pontiacs and out of a 27 pound cow, Jennie Belle, No. 6506. This bull has sired five of the promising young cows in the herd, two of which have already made records of 15,218·5 pounds milk and 12,515 pounds milk, respectively, while the other three are now running in R.O.P. and give promise of equalling or even excelling these records.

The second bull owned by the Station was L.E.S. Abbekirk Mechthilde, No. 41326, bred by Experimental Station, Lacombe, Alta. He is sired by Prince Aaggie Mechthilde, No. 8482, a noted sire of long distance producers and out of Nine Gem Lutske, No. 10674, with a record of 15,453 pounds milk and 577 pounds butter. This bull is the sire of 8 choice heifers at present in the herd and that give promise of being heard from later.

The present herd sire is Agassiz Sir Pietje, No. 51064, bred at Experimental Farm, Agassiz, B.C., sired by Maplecrest De Kol Henry, No. 40632, out of Pietje Priscille Mechthilde, No. 14123, she having a record of 15,556 pounds of milk and 681 pounds of butter.

The herd as it now stands is a striking example of what can be done from a small beginning by good feeding, careful management and the use of good bulls. The progeny of the original cows are, in most cases, exceeding, as two- and three-year-olds, the best records of their dams as mature cows.

LIST OF RECORDS COMPLETED BY COWS IN THE CANADIAN RECORD OF PERFORMANCE DURING THE YEAR 1922

Name	Age at start of Test		Month starting Test	Duration of Test	Amount of Milk	Amount of Fat	Per cent Fat	Date of next Calving
	Years.	Days.	Days.	Days.	Pounds.	Pounds.		
R. E. S. Madrigal Gypsy Keyes	3	322	Mar. 1921	365	18,522	630	3·40	Dec. 12, 1922
R. E. S. Johanna Sylvia	2	224	April 1921	365	15,219	519	3·41	June 13, 1922
R. E. S. Madrigal Sylvia	3	209	April 1921	365	14,060	562	4·00	Aug. 10, 1922
Bonnieview Gypsy Keyes	7	...	July 1921	365	13,913	478	3·43	
R. E. S. Sarcastic Sylvia	5	...	June 1921	305	13,671	457	3·34	April 28, 1922
R. E. S. Johanna Gypsy Keyes	2	10	April 1921	305	12,026	408	3·39	April 27, 1922

DAIRY HERD RECORDS

Following is a statement of the production of each of the seven cows ending their lactation period within the calendar year 1922, together with amount of feed consumed and profit from each cow:—

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	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 Green Feed eaten at $10 per ton	Amount of Straw eaten at 20c. per cwt.	Months on Pasture at $1 and $2 per month	Total cost of Feed for Period	Total value of Product at 1¼c.	Profit on Product	Cost to Produce 100 lbs. Milk
													$ cts.	$ cts.	$ cts.	$ cts.
18	5	409	14,002·3	34·2	.....	.....	4,362	11,140	1,575	2,497	2,715	4·5	101 76	210 30	108 54	0 72
89	5	440	14,802·2	33·6	3·43	507·7	4,419	10,880	.....	3,410	2,270	7·6	104·68	222 00	117 32	0 77
77	4	308	13,698·0	44·4	3·34	457·5	3,858	7,820	.....	2,647	1,760	4·5	79 38	205 30	125 92	0 58
80	3	570	23,701·6	41·6	3·40	805·8	7,239	12,320	1,095	3,410	3,005	8·8	144 88	355 50	210 62	0 61
78	3	465	16,793·9	36·1	4·00	671·7	4,994	12,680	675	3,412	2,720	6·5	116 01	251 90	135 89	0 69
79	1	431	16,539·7	38·4	3·41	564·0	4,735	13,040	810	3,412	2,815	4·9	111 98	248 10	136 12	0 68
81	1	346	12,515·7	36·2	3·40	425·0	3,762	8,640	825	2,300	2.085	4·5	83 50	187 70	104 20	0 67
Total for Lactation Period																

Careful handling is necessary for maximum milk production and a cow does not give all her milk to an attendant who is rough or unkind or if, for any reason, she becomes excited. This was illustrated in the Station herd during the summer of 1922. During June and July the attendants were quiet and kind and good milkers. At the first of August there was a change and, although the new attendants were kind, their manner was exciting. Besides this they were poor milkers. Early in October one of the July attendants was in charge again. Early in November the cattle were changed to new quarters to which they did not take kindly for nearly two weeks. They also underwent the tuberculin test. The yields for four of the cows for these five months were as follows:—

July	6,347 lbs.	Quiet efficient attendants
August	5,063 "	Attendants changed twice and all inefficient
September	4,477 "	Inefficient attendants
October	4,681 "	July herdsman returned
November	4,073 "	Cattle changed to new stable and also underwent tuberculin test

In our experience with dairy cattle, the milk flow frequently drops due to some form of excitement and by careful management it is generally partially restored but never once has it been brought back to what it was before the interruption.

COST OF RAISING CALVES

To determine the cost of raising calves to producing age.

In 1921, four heifer calves were dropped in April and records kept of the feed. They were fed whole milk for the first three months, starting at two pounds at a feed three times daily and ending with ten pounds. From three to six months they were fed skim-milk, first at thirty pounds per day and gradually decreasing to six pounds per day at the finish.

Whole oats were left available in a box as was also salt, and whenever there was no grass, morsels of hay or green oats or leaves such as cabbage and lettuce and other refuse from the garden was given to them. Throughout the summer they had the shelter of a shed and the run of a small yard. For winter quarters they were turned loose into a building that afforded shelter only from the wind and not from low temperatures. Here they were fed meal, two pounds per day, sliced turnips or ensilage, ten pounds per day, and hay or green oats all they could eat up clean. At the end of a year they were thrifty but not too fat and averaged slightly over 800 pounds. Following is the statement of cost of raising four calves for one year:—

——	Pounds	At	Cost
		$	$
First six months—			
Whole milk	6,480	1 50 cwt.	97 20
Skim-milk	6,480	10 "	6 50
Mixed meals, oats, barley, bran, oilcake, etc.	450	01 lb.	4 50
Hay, green oats, etc.	200	00½ "	1 50
			109 70
Second six months—			
Mixed meals	1,480	01 "	14 80
Roots and ensilage	7,400	5 00 ton	18 50
Hay, green oats, etc.	3 tons	15 00 "	45 00
			78 30
Total cost of raising four calves for one year			188 00
Total cost of raising one calf for one year			47 00

The expensive feature of this feeding is the large amount of whole milk fed during the first three months. This might have been obviated by the use of milk substitutes but in view of the fact that the herd is of very high merit and that the bull calves have commanded a price of over two hundred dollars when a year old for the past two years, we could not feel justified in risking the welfare of the calves with anything but the very best feed available.

SHEEP

The breeding flock was reduced to thirty breeding ewes and twenty ewe lambs in the fall of 1921. From the twenty ewes forty-five lambs were raised to maturity. Trouble had been experienced in previous years with goitre in lambs but only one case appeared in 1922.

The flock of sheep has been developed from one hundred range-bred, grade ewes in 1915 on which pure-bred Leicester rams have been used. The resulting flock is very even in type and size, somewhat deeper bodied than the pure Leicester and possessed of a finer and closer wool. The fleece does not part on the back. The average weight of thirty-seven fleeces was 8·7 pounds.

SWINE

From twelve brood sows seventy-three pigs were raised to marketable age. Heretofore Berkshire was the only breed kept at the Station but in February a Tamworth sow in pig was purchased. She had a litter of eleven and raised them all. This will provide a means of carrying on some comparison of breed tests another year.

There is no adequate accommodation at the Station for taking care of fall litters and consequently only spring litters are raised. An attempt has been made to determine an inexpensive means of summering brood sows from the time the spring litters are weaned to breeding time in the fall. The sows after weaning time are kept in small pastures for a week or longer, depending upon their physical condition and are fed to bring them into a fair condition of flesh. They are then turned out into a large pasture with access to water and left for the rest of the summer. After threshing they are allowed the run of the stubble fields and after the ground is frozen are brought up to the buildings. The feed from June until the middle of November is pasture only.

FIELD HUSBANDRY

The work in field husbandry in 1922 was almost altogether confined to rotations. This work has been carried on for ten years, during which time six rotations have been tried.

Rotation C is a three-year rotation.

First year—Summer-fallow.
Second year—Wheat.
Third year—Wheat.

This rotation has suffered severely on the Experimental Station from soil drifting during the years 1918, 1919 and 1920. It makes no return of root fibre to the soil, as there are no hay crops included and it makes no return of manure because there are no fodder crops to support live stock. It has been temporarily discontinued.

A five-year rotation was begun in 1917 on land that had been broken from prairie sod in 1913. The order of this rotation was:—

First year—Summer-fallow sown to winter rye.
Second year—Winter rye.
Third year—Wheat.
Fourth year—Oats.
Fifth year—Barley.

In view of the fact that land which either had not been in sod or had not been manured within the previous six years drifted badly in 1918, 1919 and 1920, this rotation was modified in 1922 to include an intertilled crop and a hay crop. The rotation is now:—

First year—Sunflowers.
Second year—Wheat.
Third year—Oats.
Fourth year—Barley seeded down.
Fifth year—Hay.

A rotation such as this, which produces so much fodder and necessarily requires the keeping of live stock, returns to the soil a great deal of manure which counteracts very much any tendency to soil drifting.

Rotation J consists of:—

First year—Summer-fallow.
Second year—Wheat.
Third year—Wheat.
Fourth year—Oats seeded down to western rye grass.
Fifth year—Hay.
Sixth year—Hay.

This can be recommended as a satisfactory rotation for a half section farm carrying a limited amount of stock, where labour is a problem.

Rotation J2 is a modification of J by eliminating the summer-fallow and including an intertilled crop between the crops of wheat. This rotation is:—

First year—Wheat.
Second year—Intertilled crop.
Third year—Wheat.
Fourth year—Oats seeded down to western rye grass.
Fifth year—Hay.
Sixth year—Hay.

This has not been carried on sufficiently long to determine its value.

Rotation " P " is an eight-year rotation, having the crops in the following order:—

First year—Summer-fallow.
Second year—Wheat.
Third year—Wheat.
Fourth year—Summer-fallow.
Fifth year—Intertilled crop.
Sixth year—Barley seeded down to western rye grass.
Seventh year—Hay.
Eighth year—Pasture.

This is really a double rotation. It requires too many divisions in the farm for the practical farmer, but, nevertheless, after being carried on for ten years, shows that crops may be grown even in dry seasons.

Rotation " R " has:—

First year—Summer-fallow.
Second year—Wheat.
Third year—Oats seeded down to western rye grass.
Fourth year—Hay.
Fifth year—Hay.
Sixth year—Summer-fallow.
Seventh year—Intertilled crop.
Eighth year—Wheat.
Ninth year—Oats.

This, like rotation " P," is a rotation within a rotation and requires too many fields, but, also like rotation " P," it provides conditions whereby the land is kept clean and productive.

Following are some conclusions derived from work with rotation of crops:—

Land which had been manured or had been seeded to grass between 1911 and 1917 did not drift in the dry years of 1918, 1919 and 1920, although adjoining land which had been growing only grain grew no crop during those bad years, because of soil drifting.

The corn crop was a failure in the years 1915 to 1919 inclusive, because of frost in 1915 and 1917, hail in 1916, and drouth and soil drifting in 1918 and 1919, whereas turnips were a profitable crop in all of those years. Sunflowers were not grown at the Experimental Station till 1919, but judging from results of this crop in gardens in the surrounding district, there is good reason to suppose that it would have been a profitable crop every year, except 1916, when hail would have destroyed it.

An intertilled crop following summer-fallow and given proper attention is an insurance against wild oats.

Western rye grass hay is usually an unprofitable crop on account of low yields, except in seasons of plenty of moisture, yet, by leaving a large residue, prevents soil drifting in dry seasons.

In examining the following tables of rotation records some explanations may be necessary.

In the rotations in which sunflowers are used the cost per acre of growing sunflowers shows less in some cases than the cost per acre of growing some of the grains. This apparent discrepancy is due to the fact that the cost of the grain is carried through until it is threshed whereas the cost of the sunflowers is carried only until the crop is cut and lying on the ground. Likewise the cost of turnips is carried only until the crop is dug.

The cost of hauling and cutting the sunflowers into the silo was calculated for two fields in 1922 and showed in one case $1.38 and in another $1.61 per ton. This included labour and charges for tractor and cutting box, gasoline, oil and engineer. The difference in the cost figures was largely due to the different distances in hauling.

The cost of loading, hauling and delivering into the cellar of turnips from two fields was $1.01 and 73 cents respectively. The difference was partly due to a difference in distance of hauling and partly to a difference in the size of the turnips. The turnips in one crop were very much larger than in the other and could, therefore, be handled much more easily.

COST AND RETURN VALUES 1922

Statement of Return Values

Wheat (from the machine)	per bush.	$ 80
Barley (from the machine)	"	40
Oats (from the machine)	"	30
Western rye grass hay	per ton	7 00
Oat straw	"	2 00
Wheat straw	"	50
Barley straw	"	2 00
Sunflowers	"	3 00
Corn	"	3 00
Turnips	"	3 00
Green oat hay	"	5 00

Statement of Cost Values

Rent	per acre		2 00
Barnyard manure	per ton		1 00
Seed wheat	per bush.		1 50
Seed oats	"		1 00
Seed barley	"		1 25
Seed turnips	per lb.		1 00
Seed sunflowers	"		25
Seed western rye grass	"		09
Seed corn	"		10
Machinery	per acre		1 00
Horse labour (including teamster)		Summer	Fall
Single horse	per hour	$ 37	47
Two-horse team	"	49	59
Three-horse team	"	61	71
Four-horse team	"	73	83
Manual labour	"	25	35
Threshing—			
Wheat	per bush.		13
Oats	"		10
Barley	"		11
Twine	per lb.		14

ROTATION RECORD—5-YEAR—(1ST YEAR, SUNFLOWERS; 2ND YEAR, WHEAT; 3RD YEAR, OATS; 4TH YEAR, BARLEY S.D.; 5TH YEAR, HAY)

Rotation Year	Crops: Last Year	Crops: This Year	Area	Items of Expense in Raising Crop: Rent and Manure	Seed, Twine and use of Machinery	Manual Labour: Hours Manual Labour	Manual Labour: Cost of Manual Labour	Horse Labour (including Teamster): Hours: Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton	Height of Stubble	Particulars of Crop: Weight: Grain	Straw	Hay	Hoed Crop	Total value	Value of Crop per Acre	Profit or Loss per Acre
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
1	Barley	Sunflowers	5	10 00	25 36	42	10 50	.....	13	10	16·5	25 52	.....	71 32	14 26	.....	1 42	6	.....	.....	.....	100·429	150 65	30·13	15 87+
2	Fallow	Wheat	5	10 00	15 78	6	2 10	.....	.....	.....	13·0	9 84	20 67	58 39	11 68	0 37	.....	6	9,540	11,310	.....	.....	130 03	26·01	14 33+
3	Rye	Oats	5	10 00	16 68	6	2 10	.....	.....	.....	24·5	18 24	23 80	70 82	14 16	0 30	.....	5	8,092	6,848	.....	.....	78 25	15 65	1 49+
4	Wheat	Barley S.D.	5	10 00	15 78	6	2 10	.....	.....	.....	29·0	21 57	16 56	66 01	13 20	0 44	.....	5	7,224	7,946	.....	.....	68 15	13·63	0 43+
5	Oats	Barley	5	10 00	15 78	6	2 10	.....	.....	.....	29·5	21 94	9 13	58 95	11 79	0 71	.....	5	3,984	5,046	.....	.....	38 25	7 65	4 14−
	Cost of sowing grass charged to whole rotation		...	.....	10 80	4	1 00	.....	.....	.....	.....	.....	.....	11 80	2 36	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 36−
Aggregate			25	50 00	100 12	70	19 90	.....	.....	.....	.....	97 11	70 16	337 29	67 45	.....	.....	.....	28 840	31,150	.....	100·429	465 33	93 07	25 62+
Average per acre, 1922			...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13 49	.....	.....	.....	.....	.....	.....	.....	.....	18 61	5 12+

ROTATION RECORD "J"—(1ST YEAR, FALLOW; 2ND YEAR, WHEAT; 3RD YEAR, WHEAT; 4TH YEAR, OATS SEEDED DOWN; 5TH YEAR, HAY; 6TH YEAR, PASTURE)

Rotation Year	Crops: Last Year	Crops: This Year	Area	Items of Expense in Raising Crop: Rent and Manure	Seed, Twine and use of Machinery	Manual Labour: Hours Manual Labour	Manual Labour: Cost of Manual Labour	Horse Labour (including Teamster): Hours: Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton	Height of Stubble	Particulars of Crop: Weight: Grain	Straw	Hay	Hoed Crop	Total value	Value of Crop per Acre	Profit or Loss per Acre
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
2	Fallow	Wheat	12	24 00	38 70	10	3 50				28	21 04	41 60	128 84	10 74	0 38		6	19,200	33,586			264 39	22 03	11 29+
3	Wheat	Wheat	12	24 00	38 00	12	4 20				61·5	45 74	38 35	150 29	12 52	0 51		6	17,700	15,602			239 90	19 99	7 47+
4	Wheat	Oats S.D.	12	24 00	39 36	8	2 80				62·5	46 27	42 40	154 83	12 90	0 36		5	14,416	14,234			141 43	11 79	1 11−
5	Oats S.D.	Oats S.D.	12	24 00	38 80	8	2 80				59·5	44 08	48 30	157 98	13 16	0 33		5	16,422	11,718			156 62	13 05	0 11−
6	Oats S.D.	Oats	12	24 00	39 23	8	2 80				55·5	41 16	26 20	133 39	11 12	0 51		5	8,908	12,642			91 24	7 60	3 52−
1	Oats	Fallow	12	24 00	12 00						68·0	49 64		85 64	7 14										7 14−
Cost of sowing grass charged to whole rotation					52 29	23	5 75							58 04	4 83										4 83−
Aggregate			72	144 00	258 38		21 85					247 93	196 85	869 01	72 41				76,646	87,782			893,38	74 46	2 05+
Average per acre, 1922															12 07									12 41	0 34+
Average per acre for 10 years, 1912–13–14–15 (2 acre plots) 1917–18–19–20 (5-acre plots) 21–22 (12-acre plots)															8 31									12 62	4 31+

ROTATION RECORD—"J2"—1ST YEAR, SUNFLOWERS; 2ND YEAR,- WHEAT; 3RD YEAR, OATS SEEDED DOWN; 4TH YEAR, HAY; 5TH YEAR, PASTURE; 6TH YEAR, WHEAT)

Rotation Year	Crops		Area	Items of Expense in Raising Crop															Particulars of Crop						
						Manual Labour		Horse Labour (including Teamster)											Weight						
								Hours																	
	Last Year	This Year		Rent and Manure	Seed, Twine and use of Machinery	Hours Manual Labour	Cost of Manual Labour	Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton	Height of Stubble	Grain	Straw	Hay	Hoed Crop	Total value	Value of Crop per Acre	Profit or Loss per Acre
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
5	Oats S.D.	Oats for Hay	5·0	10 00	15 00	.....	.....	.....	7·0	.....	20·00	18 03	.....	43 03	8 60	.....	5 06	3	.....	.....	17,100	.....	42 75	8 55	0 05–
6	Oats	Wheat	5·0	10 00	15 77	6·5	2·10	.....	.....	.....	26·00	19 33	13 91	61 11	12 22	0 57	.....	6	6,420	6,270	.....	.....	87 17	17 43	5 21+
1	Wheat	Sunflowers	2·5	5 00	13 27	25·5	6·38	.....	6·5	5	9·75	13 85	.....	38 50	15 40	.....	1 33	6	.....	.....	.....	57,935	86 90	34 76	19 36+
		Corn	2·5	5 00	6 40	21·0	5·25	.....	4·5	5	9·75	12 87	.....	29 52	11 80	.....	1 34	5	.....	.....	.....	43,928	65 90	26 36	14 55+
2	Sunflowers	Wheat	5·0	10 00	15 64	6·0	2·10	.....	.....	.....	26·5	19 69	15 21	62 64	12 53	0 53	.....	6	7,020	5,070	.....	.....	94 87	18 97	6 44+
3	Wheat	Oats S.D.	5·0	10 00	16 82	5·0	1·75	.....	.....	.....	28·00	20 79	17 50	66 86	13 37	0 38	.....	5	5,950	7,030	.....	.....	59 53	11 91	1 46–
4	Oats S.D.	Hay	5·0	10 00	13 55	4·0	1·00	.....	7·0	.....	.....	3 43	.....	27 98	5 60	.....	4 30	2	.....	.....	13,200	.....	46 20	9 24	3 64+
Aggregate			30·0	60 00	96 45	.....	18·58	.....	.....	.....	.....	107 99	46 62	329 64	79 52	.....	.....	.....	19,390	18,370	30,300	101,863	483 32	127 22	47 69+
Average per Acre 1922			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11 36	.....	.....	.....	.....	.....	.....	.....	.....	18 17	6 81+
Average per acre for 2 years 1921-22			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13 86	.....	.....	.....	.....	.....	.....	.....	.....	22 07	8 20+

ROTATION RECORD "P"—(1ST YEAR, FALLOW; 2ND YEAR, WHEAT; 3RD YEAR, WHEAT; 4TH YEAR, FALLOW; 5TH YEAR, ROOTS; 6TH YEAR, BARLEY S.D; 7TH YEAR, HAY; 8TH YEAR, PASTURE)

Rotation Year	Crops		Area	Items of Expense in Raising Crop														Height of Stubble	Particulars of Crop						
						Manual Labour		Horse Labour (including Teamster) Hours											Weight						
	Last Year	This Year		Rent and Manure	Seed, Twine and use of Machinery	Hours Manual Labour	Cost of Manual Labour	Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton		Grain	Straw	Hay	Hoed Crop	Total value	Value of Crop per Acre	Profit or Loss per Acre
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
6	Turnips	Barley S.D	5·0	22 50	16 48	6·0	2 10				15	11 31	20 24	72 63	14 53	0 39		5	8,832	10,358			83 95	16 79	2 26+
7	Barley S.D	Hay	5·0	22 50	15 62	4·0	1 00		7·0			3 43		42 55	8 51		6 55	2			13,125		45 94	9 19	0 68+
8	Barley S.D	Barley	5·0	22 50	16 12	6·0	2 10				24	17 92	15 84	74 48	14 90	0 52		5	6,912	8,988			66 59	13 32	1 58−
1	Barley	Fallow	5·0	10 00	5 00						41	29 93		44 93	8 99										8 99−
2	Fallow	Wheat	5·0	22 50	16 19	6·0	2 10				12	9 11	23 01	72 91	14 58	0 41		6	10,620	13,957			145 09	29 02	14 44+
3	Wheat	Wheat	5·0	22 50	16 61	6·0	2 10				26	19 33	14 82	75 36	15 07	0 66		6	6,840	7,560			93 09	18 62	3 55+
4	Wheat	Fallow	5·0	10 00	5 00						26	18 98		33 98	6 80										6 80−
5	Fallow	Sunflowers	2·5	11 25	13 55	22·5	5 62		6·5	5	3	8 92		39 34	15 74		0 77	6				102,033	153 05	61 22	45 48+
		Turnips	2·5	11 25	10 00	119·0	29 75		11·5		3	7 82		58 82	23 52		0 92					127,737	191 60	76 64	53 12+
Aggregate			41·0	155 00	144 57		44 77					126 75	73 91	515 00	122 64				33,204	40,863	13,125	229,770	779 31	224 80	102 16+
Average per acre 1922															13 62									24 98	11 35+
Average per acre for 10 years—1912-13-14-15-17-18-19-20-21-22															11 32									17 03	5 70+

ROTATION RECORD "R"—(1ST YEAR, FALLOW; 2ND YEAR, HOED CROP; 3RD YEAR, WHEAT; 4TH YEAR, OATS; 5TH YEAR, FALLOW; 6TH YEAR, WHEAT; 7TH YEAR, OATS S.D.; 8TH YEAR, HAY; 9TH YEAR, PASTURE)

Rotation Year	Crops		Area	Items of Expense in Raising Crop															Particulars of Crop						
						Manual Labour		Horse Labour (including Teamster)											Weight						
								Hours																	
	Last Year	This Year		Rent and Manure	Seed, Twine and use of Machinery	Hours Manual Labour	Cost of Manual Labour	Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	Value of Horse Labour	Cost of Threshing	Total Cost	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton	Height of Stubble	Grain	Straw	Hay	Hoed Crop	Total value	Value of Crop per Acre	Profit or Loss per Acre
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$	c. $	c. $
6	Fallow	Wheat	5·0	20 71	16 89	6	2 10				13·5	10 20	26 91	76 81	15 36	0 37		6·0	12,420	17,902			170 07	34 01	18 65+
7	Wheat	Oats S.D.	5·0	20 71	17 10	6	2 10				28·5	21 15	31 90	92 96	18 59	0 29		4·5	10,846	6,914			102 61	20 52	1 93+
8	Oats S.D.	Hay	5·0	20 71	9 27	2	0 50		6·0			2 94		33 42	6 68		6 07	2·0			10,975		38 41	7 68	1 00+
9	Oats S.D.	Hay	5·0	20 71	9 28	2	0 50		6·0			2 94		33 43	6 69		6 07	2·0			11,380		39 83	7 97	1 28+
1	Oats	Fallow	5·0	10 00	5 00						23·0	16 79		31 79	6 36										6 36−
2	Fallow	Sunflowers	2·5	10 35	12 65	21	5 25		6·5	5	1·5	7 83		36 08	14 43		0 93	6·0				76,805	115 21	46 08	31 65+
		Turnips	2·5	10 35	10 00	78	19 50		11·5		1·5	6 73		46 58	18 63		1 09					84,901	127 35	50 94	32 31+
3	Sunflowers	Wheat	5·0	20 71	15 42	6	2 10				26·5	19 69	15 60	73 52	14 70	0 61		5·0	7,200	8,690			98 17	19 63	4 93+
4	Wheat	Oats	5·0	20 71	16 26	6	2 10				25·5	18 96	24 90	82 93	16 59	0 33		4·5	8,466	9,324			84 02	16 80	0 21+
5	Oats	Fallow	5·0	10 00	5 00						39·5	28 83		43 83	8 77										8 77−
Aggregate			45·0	164 96	116 87		34 15					136 06	99 31	551 35	126 80				38,932	42,830	22,355	161,706	775 67	203 63	76 83+
Average per acre 1922															12 68									20 36	7 68+
Average per acre for 10 years—1912-13-14-15-17-18-19-20-21-22															10 37									16 97	6 60+

HORTICULTURE

From a horticultural standpoint the season of 1922 as a whole was better than average. The lack of rain in July, however, caused an early ripening of the peas and beans, checked the growth of the other vegetables and the annual flowers and browned the lawns. Heavy rains of August, September and October did much towards reviving everything that had not ripened and final results were above the average.

ARTICHOKE—VARIETY TEST

Tubers of the Jerusalem artichoke grown on the Station in 1921 were grown in comparison with those sent from the Central Farm with the following results:—

Source	Date planted	Date harvested	Yield from 30-ft. rows
			lb. oz.
Ottawa	May 17	Oct. 18	12 4
Rosthern	"	"	53 14

ASPARAGUS

The variety of asparagus which is being grown on the Station is Washington. An average of 7 pounds per 30-foot row was cut from eleven rows this year.

BEANS—VARIETY TEST

Twenty-eight varieties and strains were sown in the open on May 18 in rows 30 inches apart. As a result of the dry weather which prevailed in July, the crop was very light. No green beans were picked from the rows set apart for seed and none were allowed to ripen on the rows for green beans. In addition to the 1922 yields of fourteen of the leading varieties, the two-year average yields for 1921 and 1922 are listed below:—

Variety	Yields from 30-foot rows			
	1922		Two-year average 1921–1922	
	Green	Seed	Green	Seed
	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Stringless green pod	7 9	2 0	23 11	2 12
Wardwell Kidney Wax	5 11	1 4	21 1	2 10
Davis White Wax	6 9	1 2	22 2	1 13
Refugee or 1,000 to 1	13 5	2 8	12 3	2 12
Hodson Long Pod	10 9	1 6	15 2	2 7
Extra Early Valentine	6 0	1 12	19 13	2 6
Bountiful Bush	10 6	1 14	24 2	2 7
Grennels Rustless Wax	6 1	– –	16 10	– –
Round Pod Kidney Wax	6 15	1 4	7 5	2 6
Kentucky Wonder Wax	16 8	2 12	17 4	2 10
Plentiful French	11 7	2 0	24 5	2 12
Pencil Pod Black Wax	10 6	1 4	22 15	2 10
Yellow Eye	5 8	– –	12 1	– –
Masterpiece	12 12	1 6	27 14	2 3

BEANS—CULTURAL TEST

To determine a satisfactory way of extending the season for green beans, four varieties were sown in the open on May 18, and, as a matter of comparison, four successive sowings of Round Pod Kidney Wax were made at intervals of one week. Included in the results listed below are two-year averages for 1921 and 1922.

BEANS—SUCCESSION OF SOWING VS. DIFFERENT VARIETIES

Variety	Results, 1922					2-year Average.		
	Date ready for use	Number of pickings	Length of season days	Yield from 30′ rows		Length of season days	Yield from 30′ rows	
				lb.	oz.		lb.	oz.
Round Pod Kidney Wax....	July 26	3	18	2	0	22·0	10	10
Stringless Green Pod.....	" 24	3	20	10	5	21·5	17	7
EX. Early Valentine.....	" 26	2	18	11	14	22	10	3
Refugee or 1000 to 1.....	Aug. 4	2	9	5	10	18	15	12
Round Pod Kidney Wax:								
Sown on May 18.....	July 26	3	18	2	0	22·0	10	15
" May 25.....	Aug. 12	1	1	13	11	17·5	17	4
" June 1.....	" 12	3	18	14	14	22·5	20	6
" June 8.....	" 12	3	18	25	3	16·5	20	10

A SUMMARY OF TWO-YEAR AVERAGE RESULTS SHOWS:

	Total yield from 4 30′ rows		Total length of Season
	lbs.	oz.	
	lbs.	oz.	days
Succession of varieties.....	54	6	25·0
Succession of sowings of one variety.....	68	15	32·5

GARDEN BEETS—VARIETY TESTS

Six varieties and strains were sown in the open on May 17. All were harvested on September 22. Yields from 30-foot rows, 30 inches apart were:—

BEETS—TEST OF VARIETIES

Variety	Source	Yield	
		lb.	oz.
Black Red Ball.....	Burpee.....	112	0
Detroit Dark Red.....	MacDonald...	134	8
Eclipse.....	Steele-Briggs.	123	0
Eclipse.....	McKenzie.....	122	8
Early Red Blood.....	Steel-Briggs..	118	0
Edmunds Early Turnip.....	Rosthern.....	122	0

BEETS—THINNING EXPERIMENT

The object of this experiment is to determine the best distance to thin beets in the row. The variety used was Detroit Dark Red. Seed was sown on May 17 in rows 30 inches apart and the beets were harvested on September 21. The table below includes the two-year average yields for 1921-22 in addition to the 1922 yield.

BEETS—THINNING EXPERIMENT

Distance apart in rows.	Yield from 33⅓-foot rows			
	1922		Two-year average 1921-1922	
	lb.	oz.	lb.	oz.
2 inches	152	2	125	9
3 "	141	8	118	4
4 "	118	0	117	0

BRUSSELS SPROUTS—VARIETY TEST

Seed of Sutton Dwarf Gem was sown in the hotbed April 17. The plants were pricked out into the cold-frame and set out in the open. The weight of sprouts from twenty plants was 13 pounds.

CABBAGE—VARIETY TEST

Eight varieties and strains were tested this year. Seed was sown in the hotbed April 17. Plants were grown to maturity in the open. The weight of ten average heads of each variety together with some two-year averages are given below:—

CABBAGE—TEST OF VARIETIES

Variety	Weight of 10 average heads			
	1922		Two-year average 1921-1922	
	lb.	oz.	lb.	oz.
Flat Swedish	109	9	86	5
Coppenhagen Market	79	5	77	2
Ex. Amager Danish Ballhead (Ottawa) (0-1193)	83	7	65	12
Kildonan	52	12	60	7
Early Jersey Wakefield	56	6	59	12
Early Paris Market	47	9	50	10
Early Winningstadt	40	7		
Ex. Amager Danish Ballhead (0-934-2-3 Ottawa)	46	5		

CARROTS—VARIETY TEST

Five varieties and strains were sown in rows 30 inches apart on May 17. Listed below are yields, from 30-foot rows, when the roots were dug on September 21 together with some two-year averages for 1921-1922:—

CARROTS—TEST OF VARIETIES

Variety	1922		Two-year average 1921-1922	
	lb.	oz.	lb.	oz.
Chantenay	83	8	95	12
Oxheart	72	0	85	0
Half-Long Nantes (Steele-Briggs)	83	10	72	13
" " (MacKenzie)	76	0		
Danvers Half-Long	91	8		

CARROTS—THINNING EXPERIMENT

A 100-foot row was seeded with the variety Chantenay on May 17. The row was marked off into three equal parts and the plants thinned to 1, 2, and 3 inches in respective sections of the row. All were dug on September 21. The yields for 1922, together with the two-year averages, for 1921 and 1922 are given below:—

CARROTS—THINNING EXPERIMENT

Distance to which thinned	Yield from 33⅓-foot rows			
	1922		Two-year average 1921-1922	
	lb.	oz.	lb.	oz.
Thinned to 1 inch	76	0	65	8
" 2 inches	71	0	64	0
" 3 "	42	0	46	0

CAULIFLOWER—CULTURAL TEST

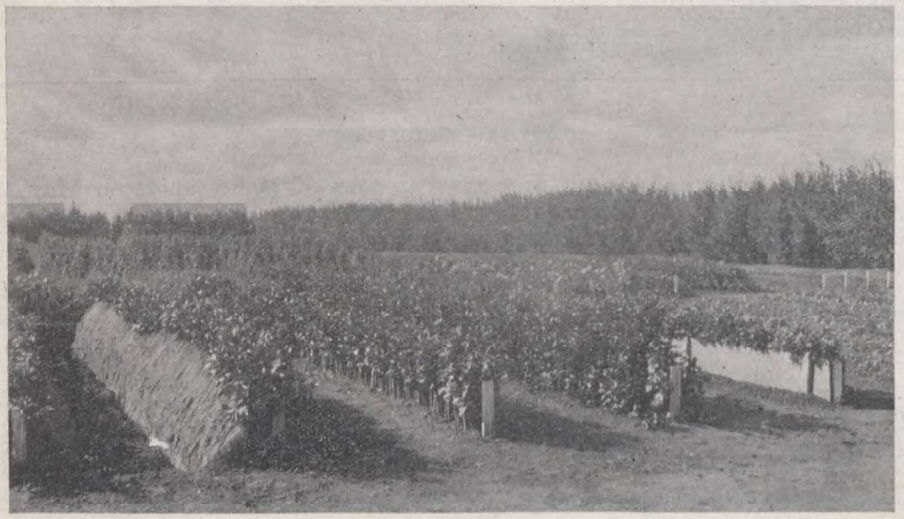
To determine whether it is better to start cauliflower plants in the hotbed and transplant them to the open or sow the seed in the open, seed of two varieties was sown in the hotbed and the plants transplanted to the open and seed of the same two varieties was sown in the open. Results were as follows:—

CAULIFLOWER—CULTURAL TEST

Variety	Started in hotbed				Sown in open			
	Ready for use		Weight of 10 heads		Ready for use		Weight of 10 heads	
			lb.	oz.			lb.	oz.
Early Snowball	Aug.	1	15	10	Aug.	1	30	5
Dwarf Erfurt	"	1	18	2	"	1	28	12

CELERY—CULTURAL TEST

To determine the value of watering in celery culture in this district, two similar areas were planted with one 15-foot row of each of seven varieties.



Methods of banking Celery. Row to right banked with boards; row to left banked with earth.—Rosthern.

The plants were set six inches apart and the rows 4 feet apart. In one area a trench was made beside the rows and this was filled with water three different times during the summer. When the water had soaked away the trench was filled in until the time of next watering. The other area was treated as in dry farming. The varieties used were the same as those in the variety test.

The method of obtaining plants was to sow the seed in flower pots in the house on March 28 and transfer the pots to the hotbed when it was started April 17. Plants were pricked out into the cold-frame and planted in the open June 15. Results are given below:—

CELERY—CULTURAL TEST

Variety	Dry		Watered	
	lb.	oz.	lb.	oz.
Giant Pascal	83	4	73	8
Dwarf White Solid	80	4	75	0
Sanford Superb	50	0	59	14
New Rose	63	0	61	0
Brandon Prize	51	6	50	0
Golden Self Blanching	34	4	41	0
White Plume	44	15	47	7

CITRON—VARIETY TEST

Seed of two varieties was sown in the open on June 1 in hills 6 feet by 4 feet apart, three plants being left in a hill. While the citron did not ripen properly on the vines and did not keep well, nevertheless they made good preserves. Following are the weights of fruits harvested from three hills of each variety:—

CITRON—VARIETY TEST

Variety	Yield	
	lb.	oz.
Colorado	62	4
Red Citron	100	5

TABLE CORN—CULTURAL TEST

To determine whether there is anything to be gained, especially in earliness, by starting corn in the hotbed, seed of three varieties was sown in the hotbed and the plants transplanted to the open, being set one foot apart in the rows. The same varieties were sown in the open, also. Listed below are the dates they were ready for use and the total number of ears during the season:—

TABLE CORN—TEST OF VARIETIES

Variety	Sown in open		Sown in hotbed	
	Ready for use	Number of ears from 30 foot row	Ready for use	Number of ears from 30 foot row
Pickaninny	Aug. 9	53	Aug. 2	123
White Squaw	" 14	35	" 9	65
Assiniboine	" 10	45	" 9	121

TABLE CORN—VARIETY TEST

Eighteen varieties of garden corn were sown in the open on May 18. The list below shows these in order of earliness together with yields for 1922 and the two-year average yield, for 1921 and 1922, for some varieties:—

TABLE CORN—TEST OF VARIETIES

Variety	Season—from to	Number of pickings	Number of days	Number of ears from 30-ft. row	Two-year average 1921-22 number of ears
Pickaninny	Aug. 9	1	1	53	75
Assiniboine	Aug. 10—Aug. 14	2	5	45	58
White Squaw	Aug. 14	1	1	35	
Indian Sweet	Aug. 16—Aug. 17	2	2	44	
Imp. Early Dakota	Aug. 17—Aug. 25	3	9	23	40
Nuetta	Aug. 22—Aug. 25	2	4	45	
Early Mayflower	Aug. 25—Sept. 5	3	12	35	40
Malakoff	Aug. 25—Aug. 29	2	5	44	46
Sweet Squaw	Aug. 25—Sept. 1	2	8	28	41
Early Malcolm	Aug. 25—Sept. 1	2	8	30	39
Gehu	Aug. 26—Aug. 29	2	4	36	
Ex. Early Cory	Aug. 29—Sept. 5	3	8	37	42
Early Fordhook	Aug. 30—Sept. 19	4	21	55	55
Pocahontas	Sept. 1—Sept. 23	3	23	40	42
Golden Bantam	Sept. 8—Sept. 15	2	8	52	41
Earliest Catawba	Sept. 8—Sept. 12	2	5	60	
Howling Mob	Sept. 12—Sept. 15	2	4	35	27
Evergreen Bantam	Sept. 15—Sept. 23	2	9	23	13

CUCUMBERS—VARIETY TEST

Four varieties were sown in the open on June 1st in hills 6 feet by 4 feet apart, three plants being left in a hill. In addition to the results for 1922, listed below, the two-year average yields for 1921 and 1922 are given.

CUCUMBERS—TEST OF VARIETIES

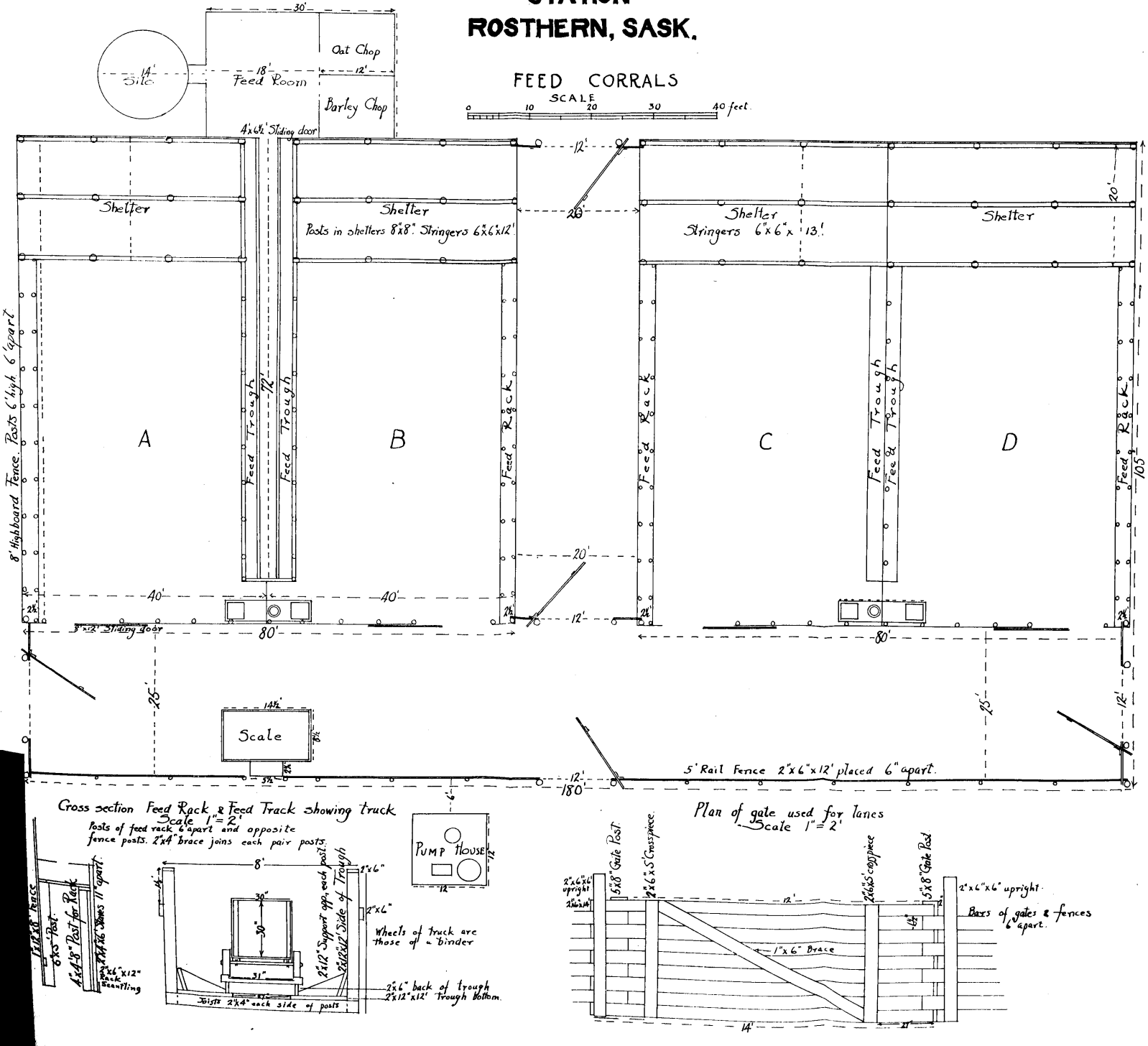
Variety	First fruit ready for use	Number of pickings	Number of days	Number of fruits from three hills (9 plants)	Two-year Average Number of fruits from three hills (9 plants)
Davis Perfect	Aug. 11....	9	32	72	41
Improved Long Green	Aug. 14....	9	29	67	43
Early Russian	Aug. 2....	12	41	158	131
West Indian Gherkin	Aug. 11....	6	32	2 lb., 7 oz.	1 lb., 14 oz.

KOHL RABI—VARIETY TEST

Two varieties were sown on May 17 and were ready for use August 8. The weights when dug on October 20 were:—

Variety	Yield from 30-ft row	
	lb.	oz.
Large Green Vienna	60	8
Early Purple	68	4

DOMINION EXPERIMENTAL STATION ROSTHERN, SASK.



Cross section Feed Rack & Feed Track showing truck
Scale 1" = 2'

Posts of feed rack 6' apart and opposite fence posts. 2"x4" brace joins each pair posts.

Plan of gate used for lanes
Scale 1" = 2'

LEEKS—CULTURAL TEST

To determine whether better results would be obtained from starting leeks in the hotbed or sowing the seed in the open, seed of three varieties was sown in flower pots in the house on March 28. The pots were transferred to the hotbed on April 17, the plants pricked out into the cold-frame April 26 and planted in the open June 1, being set 9 inches apart in the rows in the open. The same varieties were sown in the open on May 18. These were not thinned and were small and would be of little use commercially. All were harvested October 1 with yields as follows:—

LEEKS—CULTURAL TEST

Variety	Started in hotbed		Sown in open	
	lb.	oz.	lb.	oz.
Large Carentan	17	4	29	2
London Flag	16	10	26	0
Scotch Musselburg	15	8	23	4

LETTUCE—VARIETY TEST

From the results obtained here the following recommendations are made:—

LETTUCE—TEST OF VARIETIES

Type	Variety	Remarks
Leaf	Grand Rapids	Can be used from the middle of June on.
Head—Early	Deacon	Ready for use about July 7.
Head—Late	Big Boston	
	Hanson	

MUSK MELON—VARIETY TEST

Seed of five varieties and strains were sown in the open on June 1, in hills 6 feet by 4 feet apart, three plants being left in a hill.

MUSKMELON—TEST OF VARIETIES

Variety	Yield from three hills		Remarks
	lb.	oz.	
*Rempel	18	11	2 fruits ripened on vines.
Extra Early Hackensack	5	9	None ripened on vines.
Hearts of Gold	4	1	" "
Milwaukee Market (Vaughan)	3	12	" "
Milwaukee Market (Ottawa)	0	12	" "

*NOTE—This was seed obtained from a Mr. Rempel of Rosthern.

PARSNIPS—CULTURAL TEST

The experiment in thinning to different distances was continued, using the variety Hollow Crown. On May 18 the seed was sown in a 100-foot row. This row was divided into three equal parts and the plants thinned to 2, 3, and 4 inches in respective sections of the row. All were harvested September 3 and the yields were as follows:—

PARSNIPS—CULTURAL TEST

Distance thinned to—	Yield from 33⅓-ft. rows	
	lb.	oz.
2 inches apart	61	0
3 inches apart	69	0
4 inches apart	57	0

GARDEN PEAS—VARIETY TEST

In conjunction with the variety test a comparison was made of commercial and Ottawa grown varieties and strains with seed which was ripened on this Station. Twenty-five varieties and strains were grown with the following results from 30-foot rows:—

GARDEN PEAS—TEST OF VARIETIES

Variety	1922 Yields								
	Commercial and Ottawa Seed				Rosthern Seed				
	Date of first picking	Green		Ripe		Date of first picking	Green		Ripe	
		lb.	oz.	lb.	oz.		lb.	oz.	lb.	oz.
Stratagem	Aug. 3	8	7	2	8	Aug. 10	11	7	2	4
American Wonder	July 25	7	12	1	4	" 3	6	14	1	14
Gradus	" 18	12	10	2	0	July 25	10	1	2	12
Eight Weeks	" 13	9	15	1	12	" 28	7	9	1	8
English Wonder	" 20	7	5	2	0	" 28	10	1	1	8
Pioneer	" 18	13	7	2	4	Aug. 3	9	1	2	4
McLean Advancer	" 25	15	12	3	8	" 4	12	3	2	2
Gregory Surprise	" 18	11	9	1	8					
Richard Seddon	" 25	12	8	3	4					
Sutton Excelsior	" 20	4	6	0	8					
Thos. Laxton (Ottawa)	" 25	7	11	2	4					
Thos. Laxton (McDonald)	" 18	5	2	—	—					
Lincoln	" 28	17	7	3	0					
Harrison Glory	" 28	11	11	3	6					
Manifold						July 28	9	5	1	6
Western Beauty						" 28	7	7	1	6
Homesteader						Aug. 4	11	14	2	14
Stevenson						" 4	7	2	0	12

GARDEN PEAS—CULTURAL TEST

To learn whether the season for green peas could be more easily extended by the use of varieties of different seasons or by succession of sowings of one variety, four different varieties were sown on May 18 and four successive sowings of Thos. Laxton were made at intervals of one week between sowings. Included in the results listed below are two-year averages for 1921 and 1922.

GARDEN PEAS—CULTURAL TEST

Variety	1922			2-year average 1921-1922		
	First picking	Number of pickings	Length of season	Yield from 30-ft. row	Length of Season	Yield from 30-ft. rows
			days	lb. oz.	days	lb. oz.
Thos. Laxton	July 18	6	24	17 8	35	16 11
Gradus	" 22	5	20	17 0	22	15 7
Stratagem	Aug. 3	3	12	18 11	10	13 8
McLean Advancer	July 26	5	20	18 14	22	19 1
Thos. Laxton—						
Sown on May 18	" 18	6	24	17 8	35	16 11
" May 25	" 22	5	20	14 14	16	15 6
" June 1	" 28	3	14	12 3	19	11 10
" June 8	Aug. 3	3	12	10 12	23	12 11

A summary of the two-year average results shows:—

	Total yield of green peas from four 30-ft rows		Length of season
	lb	oz.	days
Succession of varieties	64	13	28
Succession of sowings of one variety	56	8	37·5

PEPPERS—VARIETY TESTS

Four varieties were sown in flower-pots in the house on March 28 and the pots transferred to the hotbed when it was made in April. The plants were picked out into the cold-frame and set two feet apart in the rows when planted in the open about June 1. A few fruits of Harris Earliest and Neapolitan ripened in the open but none of the small Red Chili or Long Red Cayenne. The remainder of the fruit ripened indoors.

PUMPKIN—VARIETY TEST

Four varieties were sown in the open on June 1 in hills 8 feet by 6 feet apart, three plants being left to a hill. None of the pumpkins were fully ripened when it became necessary to harvest them on September 11 to avoid frost. In addition to yields from three hills of each variety, the two-year average yields for 1921 and 1922 are given below:—

PUMPKINS—TEST OF VARIETIES

Variety	Yield			
	1922		Two-year average 1921–1922	
	lb.	oz.	lb.	oz.
King of Mammoth	97	9	65	14
Small Sugar	61	12	48	14
Connecticut Field	146	4	88	3
Quaker Pie	—	—	—	—

POTATOES—VARIETY TEST

Seventeen varieties were tried this year. Yields per acre for 1922, as given below, are based upon the yield from six rows each 68 feet long and 36 inches apart.

POTATOES—TEST OF VARIETIES

Variety	1922	Eight-year average (1914 to 1921 inclusive)
	bush.	bush.
·ish Cobbler	418	256
:mpire State	378	269
Wee MacGregor	357	281
Rawlings Kidney	352	289
Dreer Standard	341	282
Late Puritan	340	281
Carman No. 1	339	273
Morgan Seedling	330	291
Vick Extra Early	318	270
Reeves Rose	311	278
Everitt	310	297
Moneymaker	301	284
Gold Nugget	282	—
Bovee	281	231
Rochester Rose	280	274
Early Ohio	263	287
Dalmeny Beauty	262	291

POTATOES—SOURCE OF SEED

Influence of source of seed upon yield.—In the spring of 1921 Irish Cobbler seed potatoes were sent from this Station to Beaverlodge, northern Alberta, Silver Stream, northeastern Saskatchewan, Debden, northern Saskatchewan, and to Scott, western Saskatchewan. In the fall one-half bushel of the progeny was returned to the Station. These were tested in 1922 under uniform conditions with the following results:—

POTATOES—SOURCE OF SEED

Source	Yield per acre					
	Large		Small		Total	
	bush.	lb.	bush.	lb.	bush.	lb.
Beaverlodge	339	52	78	18	418	10
Silver stream	320	18	60	30	380	48
Debden	254	27	47	27	301	54
Rosthern	259	12	67	1	326	13
Scott	215	40	44	8	259	48

SQUASH—VARIETY TEST

Five varieties were sown in the open on June 1st in hills 8 feet by 6 feet apart, three plants being left in a hill. Some of the English vegetable marrows were ready for harvesting as early as August 28 but the bulk of the crop and all from the other varieties was harvested on September 11. Yields from three hills were:—

SQUASH—TEST OF VARIETIES

Variety	Yield from three hills	
	lb.	oz.
English Vegetable Marrow	38	7
Long White Bush Marrow	17	5
Golden Hubbard	151	2
Hubbard	12	7
Delicious	33	8

SWISS CHARD—VARIETY TEST

The variety Giant Lucullus was sown in the open on May 17 and was ready for use by July 15. It made excellent growth and was of good quality.

TOMATOES

The usual variety test was conducted, the three cultural experiments started in 1921 were continued and an additional one started.

In raising the plants, the seed was sown in flower-pots in the house on March 28 and the pots transferred to the hotbed when it was started in April. The plants were pricked out into flats, forty-eight being put into a flat 21 inches by 14 inches by 4 inches. These flats were put into another hotbed. In the "Twice transplanting" experiment the plants were taken from these flats and thirteen put into a flat of the same size. The plants were hardened off and transplanted to the open about June 1st.

Except where stated otherwise the plants were set 4 feet apart in rows 4 feet apart; trimmed to one stem; tied to a stake and all the fruit allowed to develop.

TOMATOES—TEST OF VARIETIES

Variety	First Fruit Ripe	Yield from five plants, 1922						Three year average 1920 (to 1922 included) Yield from five plants					
		Ripe		Green		Total		Ripe		Green		Total.	
		lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Danish Export	Aug. 8	8	10	18	13	27	7	14	0	20	11	34	11
Burbank Early	" 15	8	6	18	15	27	5	14	12	22	5	37	1
Alacrity	" 12	13	7	18	2	31	9	14	0	23	12	37	12
Bonny Best (Carter)	" 12	6	14	25	5	32	3	10	12	26	15	37	11
Red Head	" 15	4	15	25	5	30	4	9	8	26	4	35	12
Chalks Jewel	" 12	5	6	26	9	31	15	8	14	25	6	34	4
Earlibell	" 22	5	3	22	8	27	11	9	0	25	5	34	5
Prosperity	" 15	15	6	17	12	33	2						
John Baer	" 22	5	15	21	8	27	7						
Earliana	" 4	11	15	14	13	26	12						
Perfection	" 25	2	0	11	12	13	12						
Burbank	" 4	13	13	18	10	32	7						
Crimson Canner	" 12	8	0	22	5	30	5						

TOMATOES—CLOSE PLANTING EXPERIMENT

To compare the earliness of ripening and the yields from different distances of planting, a number of varieties were grown 4 feet by 4 feet apart and the same varieties were grown 2 feet apart in rows 2½ feet apart with the following results:—

TOMATOES—CLOSE PLANTING EXPERIMENT

Variety	Four feet by four feet Yield from five plants				Two feet by two and one-half ft Yield from five plants			
	First ripe	Ripe		Green	First ripe	Ripe		Green
		lb.	oz.	lb. oz.		lb.	oz.	lb. oz.
Earliana	Aug. 4	11	15	14 13	Aug. 4	6	0	12 0
Bonny Best (Carter)	" 12	6	14	25 5	" 4	3	13	13 9
Danish Export	" 8	8	10	18 13	" 4	3	14	9 2
Alacrity	" 12	13	7	18 2	" 8	6	15	4 6
Earlibell	" 22	5	3	22 8	" 8	4	6	11 14
Crimson Canner	" 12	8	0	22 5	" 8	4	10	11 9
Burbank	" 4	13	13	18 10	" 8	10	3	10 5
John Baer	" 22	5	15	21 8	" 25	3	5	16 4
Bonny Best (Stokes)	" 12	6	8	28 3	" 12	4	1	11 15
Chalks Jewel	" 12	5	6	26 9	" 8	4	11	14 0
Prosperity	" 15	15	6	17 12	" 12	9	13	10 12
Burbank Early	" 15	8	6	18 15	" 12	3	7	19 12
Red Head	" 15	4	15	25 5	" 25	1	14	16 8
Perfection	" 25	2	0	11 12	" 28	0	10	10 2

TOMATOES—CULTURAL TEST

TOMATOES TRANSPLANTED TWICE VS ONCE

Variety	Once				1922	Twice				Two year average (1921-1922)							
										Once				Twice			
	Date first ripe fruit	Yield from five plants			Date first ripe fruit	Yield from five plants				Yield from five plants				Yield from five plants			
		Ripe		Green		Ripe		Green		Ripe		Green		Ripe		Green	
		lbs.	oz.	lbs. oz.		lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
Bonny Best	Aug. 12	6	8	28 3	Aug. 4	10	15	23	10	12	0	24	14	15	12	22	12
Danish Export	" 8	8	10	18 13	" 4	10	13	17	2	13	13	19	0	17	1	21	10
Burbank Early	" 15	8	6	18 15	" 4	9	12	13	7	15	2	26	0	19	11	20	0
Average three varieties		7	13	22 0		10	8	18	1	13	10	23	5	17	8	21	7

TOMATOES TRIMMED TO TWO STEMS VS ONE STEM.

		Two stems					One stem									
Bonny Best.....	Aug. 15	5	1	35	9	Aug. 12	6	8	28	3	9	10	41	10	12	0	24	14
Danish Export...	" 8	6	13	28	0	" 8	8	10	18	13	10	3	31	0	13	13	19	0
Burbank Early...	" 4	11	4	29	1	" 15	8	6	18	15	13	4	24	2	15	2	17	9
Average three varieties.....		7	8	30	14		7	13	22	0	11	0	32	4	13	10	20	7

TOMATOES PRUNED TO ONE STEM OF THREE BUNCHES VS ONE STEM AND ALL BUNCHES

	One stem of 3 bunches					One stem and all bunches										
Bonny Best.....	Aug. 15	6	9	25	8	Aug. 12	6	8	28	3	10	14	18	15	12	0	24	14
Danish Export...	" 8	7	9	19	2	" 8	8	10	18	13	12	1	15	13	13	13	19	0
Burbank Early...	" 15	8	9	14	5	" 15	8	6	18	15	12	0	11	12	15	2	17	9
Average three varieties.....		7	9	19	15		7	13	22	0	11	10	15	8	13	10	20	7

BUSH FRUITS

CURRANTS

The black currants were badly infested with a maggot, believed to be that of the currant fruit fly (*Epochra canadensis*). Aphids did considerable injury to all varieties and the imported currant worm (*Pteronus ribesii*) made its annual appearance on the red and white currants but was quickly destroyed with a poisoned spray.

Yields from the old plantation were much below average and the fruit small. This old plantation was removed in the fall of 1922.

BLACK CURRANTS—VARIETY TEST

Eight of the nine varieties of black currants in the new plantation started in 1920 fruited this year. The heaviest yields were from Magnus, Eagle, Climax and Kerry.

STRAWBERRIES—VARIETY TEST

The accompanying table shows, in addition to the yields for 1922 of the four varieties under test, the relative merits of spring and fall plantings of strawberries. The plants were set out as early in spring as it was possible to work the land. For fall planting, the runners were rooted in small flower-pots, while still attached to the main plant, and put into the ground in August. In both cases the plants were watered several times during the summer to assure rooting of new plants and runners.

STRAWBERRIES—YIELDS PER ACRE

Variety	Planted spring of 1920			Planted fall of 1920 (August)			Planted in spring of 1922
	1921	1922	Total	1921	1922	Total	
	boxes	boxes	boxes	boxes	boxes	boxes	boxes
Dakota.....	7,819	7,187	15,006	3,397	7,550	10,947	6,375
Rosthern June bearing.....	6,650	10,648	17,298	1,887	6,752	8,639	6,409
Senator Dunlap.....	4,423	4,356	8,779	1,452	5,227	6,679	4,682
Minnesota.....	15,197	2,613	17,810	4,123	3,630	7,753	3,363

STRAWBERRIES—COMMERCIAL

With a view to obtaining all the information possible relative to growing strawberries commercially in this district, three-quarters of an acre was planted in May of this year. The variety used was Rosthern June bearing. The plants were set two feet apart in rows three feet apart. They were kept well cultivated throughout the season and the runners were placed twice. To a fall of 2·2 inches of rain within a week after planting and a total of 3·66 inches in the month of May is, no doubt, due the almost 100 per cent stand of plants. They made excellent growth during the season and have gone into winter in good condition.

RASPBERRIES—VARIETY TEST

The eight varieties planted in 1920 came into bearing this year. The yields per acre, given below, are based upon the yield from one-twelfth-acre areas and are stated in standard berry boxes (s.b.b.) which contain four-fifths of a quart.

RASPBERRIES—TEST OF VARIETIES.

Variety	Fruiting season		Yield per acre
	From	to	s.b.b.
Herbert	July 20	Aug. 19	597
The King	" 13	" 11	213
Sunbeam	" 17	" 15	408
Latham	" 24	" 22	498
Ohto	" 13	" 17	216
Miller	" 17	" 19	564
St. Regis	" 13	" 17	435
Newman No. 23	" 20	" 23	294

TREE FRUITS

APPLES

The only form of winter injury noticed on the apple trees on the Station was black heart. Trees of the following varieties bore fruit this season, Tony, Columbia, Charles, Norman, Pioneer and Kelso, but the yields were light.

PLUMS

There was practically no winter injury apparent in the plum orchard this year. Plum pockets, caused by *Exoascus pruni*, attacked the fruit of practically every tree in the orchard and in many cases the twigs and leaves also. As a result the crop was small. There was, however, sufficient fruit to permit of determining the value of many of the Cheney Seedling trees which were set out in 1912. All but 275 of the 1,120 plum trees were removed in the fall. Of this number 185 have not yet borne fruit, or further information is required as to the quality of the fruit. Of the remaining 91 trees, a few are considered to be of value for propagation and the others are to be used in selection and breeding work.

ORNAMENTAL GARDENING

ORNAMENTAL TREES AND SHRUBS

The trees and shrubs under test wintered well with the exception of spiræa Van Houttei. There was a profusion of bloom from the latter part of May until the middle of July. All made good growth during the summer and went into winter in good condition.

FLOWERS

BULBS

Fourteen single and five double varieties of Early tulips and seventeen varieties of Darwins were planted in the open in the fall of 1921. These made an excellent showing in late May and early June of 1922. In this connection it might be noted that it is not necessary to purchase new bulbs every year. If the bulbs be allowed to become fully ripened, either where they were growing or by lifting and heeling-in in some out-of-the-way place, then lifted and dried, they may be planted again in the fall and produce good bloom the following spring.

Several varieties of early tulips, twelve varieties of narcissi and five of hyacinths were used for forcing in the house during the winter with good results.

PERENNIALS AND ANNUALS

The perennial and the annual flowers in the borders furnished a continuous bloom from the time the tulips were past to the end of the season.

It is worthy of note that the following annuals grew from seed which had fallen in 1921: Antirrhinums, asters, *Calendula officinalis*, chrysanthemum, *Clarkia elegans, Coreopsis Drummondii, Coreopsis atrosanguinea*, cosmea, *Datura Wrightii*, escholtzia, helichrysum, linaria, nicotiana, petunia, mignonette, and *Tagetes signata.* With the exception of asters, daturas, antirrhinums, cosmea and tagetes, these flowered before those which had been sown in the spring of 1922 or planted out from the cold-frame.

CEREALS

Until the end of June the season was auspicious for a maximum yield. Seeding began in the last week of April and there were copious rains in May and sufficient moisture in June to keep growth continuous. July, however, was dry and by the end of the month the grain was in head and in some cases was turning yellow before ripening. There were three and a quarter inches of rain in August, nearly two of which fell within the first week. The later crops and, to a less extent, the early crops, revived and by the end of August a yield above average was harvested.

The plots in the test varieties were all one-fortieth-acre in size, except where noted.

WHEAT—TEST OF VARIETIES

Twenty varieties of wheat were compared in duplicate on one-fortieth-acre plots on summer-fallow. No rust was apparent on any varieties. Six varieties of wheat were compared on one-fifth acre plots on fall ploughed stubble land. It is significant that the order of varieties in point of yield is not the same when sown after another grain crop as when sown after summer-fallow.

Following are the tables of results:—

WHEAT—TEST OF VARIETIES—1922

Name of Variety	Date of sowing	Date of ripening	Number of days maturing	Average Length of straw including head	Yield of grain per acre	Weight per measured bushel after cleaning
				Inch	Bush. lb.	lb.
Marquis Ottawa 15	April 25	Aug. 17	114	48	43 20	63·0
Kitchener	" 25	" 17	114	48	42 40	62·0
Kinley	" 26	" 18	114	46	41 20	61·5
Red Fife Ottawa 17	" 25	" 17	114	45	39 00	61·8
Preston	" 25	" 14	111	52	37 40	62·0
Kunbanka Ottawa 37	" 25	" 17	114	54	36 20	64·0
Garnet Ottawa 652	" 26	" 4	100	45	35 40	62·4
Red Bobs Supreme	" 25	" 14	111	45	35 20	63·6
Red Bobs No. 43	" 26	" 14	110	45	34 40	61·8
Red Bobs Early Triumph	" 26	" 9	105	45	33 20	62·2
Kota	" 26	" 14	110	44	33 20	63·2
Crown Ottawa 353	" 26	" 4	100	44	33 20	62·5
Duchess Ottawa 933	"	" 4	100	40	32 00	64·0
Major Ottawa 522	" 26	" 9	105	45	30 00	61·0
Reward Ottawa 928	" 26	" 4	100	44	29 20	64·2
Rugby Ottawa 623	" 26	" 4	100	45	27 40	64·0
Pioneer Ottawa 195	" 26	" 14	110	43	26 20	62·5
Prelude Ottawa 135	" 26	" 2	98	38	23 00	62·0
Master Ottawa 520	" 26	" 4	100	42	22 00	61·2

WHEAT—COMPARISON OF YIELDS FOR 1921 AND 1922, TOGETHER WITH THE FIVE YEAR AVERAGE.

Name of Variety	Yield per acre					
	1921		1922		Average five years	
	bush.	lb.	bush.	lb.	bush.	lb.
Marquis Ottawa 15	32	20	43	20	34	30
Red Fife Ottawa 17	32	20	39	00	33	41
Kubanka Ottawa 37	22	40	36	20	30	26
Major Ottawa 522	22	40	30	00	29	59
Ruby Ottawa 623	22	20	27	40	27	22
Pioneer Ottawa 195	25	00	26	20	26	44
Crown Ottawa 353	23	00	33	20	25	24
Master Ottawa 520	18	00	22	00	24	14
Prelude Ottawa 135	18	40	23	00	21	22
Kitchener	30	40	42	40	36	40*
Preston	30	00	37	40	33	50*
Red Bobs, Supreme	30	00	35	20	32	40*
Garnet Ottawa 652	29	20	35	40	32	30*
Red Bobs, Early Triumph	22	00	33	20	27	40*

NOTE—*Average of years 1921 and 1922 only.

WHEAT VARIETIES ON STUBBLE LAND

All plots were sown on May 1.

Variety	Date ripe	Number of days maturing	Average length of head and straw	Average length of head	Actual yield of grain per acre
			inch	inch	bush. lb.
Red Fife Ottawa 17	Aug. 17	108	40'	3·5	29 55
Red Bobs	" 9	100	38	3·5	29 50
Crown Ottawa 353	" 4	95	34	3·0	28 40
Marquis Ottawa 15	" 14	105	36	3·5	28 00
Preston	" 14	105	37	3·75	25 10
Ruby Ottawa 623	" 4	95	39	3·25	23 45

A sample of Marquis wheat containing a large percentage of "piebald" or "white" or "starchy" kernels was obtained from a district in the north of the province where most of the wheat is affected in this way. Such samples are usually associated with land that has been recently cleared of poplar timber. This sample was divided into all white kernels and all red kernels and the two lots sown separately. The resulting crop was all red kernels.

OATS—TEST OF VARIETIES

Twelve varieties of oats were sown in duplicate on summer-fallow. Difficulty is experienced in treating Liberty oats for smut. If the solution is sufficiently strong to kill the smut it is likely to kill the germ of the kernel. Otherwise Liberty oats is a desirable crop for feeding poultry and young pigs.

The plots were all sown on April 27.

OATS—TEST OF VARIETIES—1922

Name of Variety	Date of ripening	Number of days maturing	Average length of straw including head	Yield of grain per acre	Weight per measured bushel after cleaning
			inch	bush. lb.	lb.
Victory	Aug. 5	100	42	80 00	34·0
Gold Rain	" 2	97	43	77 22	36·0
Longfellow, Ottawa 478	" 8	103	44	76 16	35·0
O.A.C. No. 72	" 4	99	42	74 24	35·0
Banner Ottawa 49	" 2	97	38	69 14	31·0
Leader	" 5	100	41	65 30	31 2
Gurlach	" 5	100	42	65 10	36·0
Daubeney, Ottawa 47	July 26	90	36	60 20	33·2
Alaska	" 28	92	40	53 18	37·5
Legacy, Ottawa 678	Aug. 2	97	42	52 32	33·0
O.A.C. No. 3	July 26	90	34	44 24	33·5
Liberty (Hulless), Ottawa 480	Aug. 2	97	42	41 26	46·5

All were sown April 27.

VARIETIES OF OATS ON STUBBLE LAND

Four varieties of oats were sown on fall-ploughed stubble land with the following results:—

Variety	Date sown	Date ripe	Number of days maturing	Average length of straw and head	Actual yield of grain per acre
				inch	bush. lb.
Banner, Ottawa 49	May 15	Aug. 14	91	36	56 10
Daubeney, Ottawa 47	" 11	" 2	83	32	53 26
Longfellow, Ottawa 478	" 15	" 9	86	39	45 18
Leader	" 15	" 14	91	33	43 12

OATS—COMPARISON OF YIELDS FOR 1921 AND 1922, TOGETHER WITH THE FIVE YEAR AVERAGE

Name of Variety	Yield per acre					
	1921		1922		Average five years	
	bush.	lb.	bush.	lb.	bush.	lb.
Banner, Ottawa 49	83	18	69	14	72	32
Victory	84	24	80	00	72	28
Gold Rain	58	28	77	22	67	16
O.A.C. No. 72	70	20	74	24	66	19
Daubeney, Ottawa 47	50	00	60	20	50	12
Longfellow, Ottawa 478	63	13	76	16	70	10*
Leader	70	20	65	30	68	8*
Alaska	41	26	53	18	47	22*
Liberty (hulless), Ottawa 480	49	14	41	26	45	20*

NOTE—*Average of years 1921 and 1922 only.

BARLEY—TEST OF VARIETIES

Sixteen varieties of barley were under test on summer-fallow. The hulless varieties are very satisfactory in point of yield but care must be exercised in their use as feed for stock. The plots were sown on April 28. Results were as follows:—

BARLEY—TEST OF VARIETIES

Name of Variety	Date of Ripening	Number of Days Maturing	Average Length of Straw Including Head	Yield of Grain per Acre		Weight per Measured Bushel After Cleaning
			Inch.	Bush.	Lbs.	Lb.
O.A.C. No. 21	July 31	94	40	60	20	43·8
Gold	" 31	94	30	56	12	50·5
Hannchen	" 31	94	33	55	00	50·5
Barks	Aug. 2	96	38	47	24	35·0
Trebi	July 31	94	32	47	24	44·5
Himalayan, Ottawa 59 (Hulless)	" 26	89	30	45	40	60·0
Chinese, Ottawa 60	" 31	94	40	45	00	41·5
Feeder, Ottawa 561	" 26	89	42	42	44	51·2
Junior, Ottawa 471 (Hulless)	" 26	89	33	42	24	62·8
Stella, Ottawa 58	" 31	94	40	42	04	42·0
Early Chevalier, Ottawa 51	" 26	89	40	39	08	50·0
Duckbill, Ottawa 57	Aug. 2	96	35	30	40	46·2
Albert, Ottawa 54	July 22	85	34	27	44	41·8
Success	" 22	85	35	22	24	45·0

All were sown April 28.

BARLEY—COMPARISON OF YIELDS FOR 1921 AND 1922 TOGETHER WITH FIVE-YEAR AVERAGE

Name of Variety	Yields Per Acre					
	1921		1922		Average 5 years	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Gold	46	32	56	12	41	00
O.A.C. No. 21	37	04	60	20	38	44
Stella, Ottawa 58	43	16	42	04	36	20
Early Chevalier, Ottawa 51	40	00	39	08	34	28
Junior, Ottawa 471 (hulless)	32	44	42	24	32	32
Duckbill, Ottawa 57	35	20	30	40	30	40
Success	27	24	22	24	20	39
Albert, Ottawa 54	27	44	27	44	20	22
Hannchen	65	20	55	00	60	10 x
Barks	64	28	47	24	56	2 x
Trebi	53	36	47	24	56	30 x
Chinese, Ottawa 60	46	12	45	00	45	30 x
Himalayan Ottawa 59 (hulless)	40	20	45	40	43	6 x
Feeder, Ottawa 561	29	28	42	44	36	28 x

x NOTE.—Average of years 1921 and 1922 only.

BARLEY VARIETIES ON STUBBLE LAND

Five varieties of barley were sown on three-eights acre plots on stubble land on May 15 with the following results:—

Variety	Date ripe	Number of days maturing	Average length of straw and head	Actual yield of grain per acre
			Inch.	Bush. Lb.
Hannchen	Aug. 9	86	32	38 05
Barks	" 9	86	31	37 16
Trebi	" 2	79	34	35 16
Chinese, Ottawa 60	" 4	81	36	30 00
Gold	" 9	85	28	28 05

FALL RYE—TEST OF VARIETIES

Three varieties of fall rye were sown on August 19, 1921, on fallow land. A very good growth was made in the fall of 1921 by all varieties but the leaves were much wider on the Ottawa and Rosen than on the Common. The winter of 1921-22 was very favourable for winter annuals and consequently not a good test of hardiness in fall rye. Common rye wintered one hundred per cent and was too thick for a good crop. Ottawa killed back slightly. Rosen, however, killed back severely and about ten per cent did not recover. All plots were cut on July 22. Results are tabulated below:—

FALL RYE—VARIETY TEST

Variety	Average length of straw and head	Weight per measured bushel	Yield per acre	Remarks
	Inch.		Bush. Lb.	
Ottawa 13	48	58·6	55 40	Slightly winter killed
Rosen	50	55·6	50 40	10 per cent winter killed.
Common	50	54·2	46 24	No winter killing

Though Ottawa and Rosen gave good yields and a very plump kernel, it is doubtful whether they would survive an average winter at Rosthern. Common rye, however, has been grown successfully at this Station for a number of years, proving entirely hardy except in the severest winter, 1919-20.

TIME OF SOWING FALL RYE

Four sowings of Common fall rye were made at one-week intervals in the fall of 1921. The plots were on fallow, were all sown at the same rate and depth and all made a good start before the ground froze. The winter was very favourable for fall rye and all the plots came through with one hundred per cent stand. A heavy rain with wind caused lodging on June 15 but the damage was about equal on all plots. All were ripe and cut on July 22. Results are given below:

FALL RYE—TIME OF SOWING

Date sown	Average length of straw and head	Yield per acre
	Inch.	Bush. Lb.
August 12	48	42 48
" 19	50	46 24
" 26	48	46 24
September 2	48	49 16

PEAS—TEST OF VARIETIES

Four varieties of field peas were sown on summer-fallow, Champlain at the rate of two bushels per acre and the other three at three bushels per acre. This was because Champlain is a much smaller pea. The plots were sown on May 23.

Trouble has always been experienced in threshing peas because many split and many fly through the separator. This difficulty can be partly overcome by opening the teeth and by slowing the cylinder speed to about half.

A pea crop is very conducive to weed growth and can only be grown satisfactorily on very clean land. It is also very expensive to harvest.

Results were as listed below:—

PEAS—TEST OF VARIETIES

Name of Variety	Date of ripening	Number of days maturing	Average length of seed plant	Actual yield per acre
			inches	lbs.
Champlain, Ottawa 32	Aug. 10	99	36	2,800
Arthur, Ottawa 18	" 30	99	46	2,720
Early Feed, Ottawa 30	" 25	94	48	2,600
Chancellor, Ottawa 26	" 18	87	46	2,400

FLAX—TEST OF VARIETIES

Only two varieties of flax were grown this season but the yields were much better than for several years past. Harvesting was done with the grain binder after the grain and straw were dry. No twine was used. At this time no difficulty was experienced in cutting and the flax was fit to thresh immediately. The two varieties are very similar in appearance and were both sown May 22. Following are the results:—

FLAX—TEST OF VARIETIES

Name of Variety	Date of ripening	Number of days maturing	Average length of plants	Strength of straw on a scale of 10 points	Actual yield of seed per acre
			inch		pounds
Novelty	Sept. 10	111	20	10	960
Premost	" 10	111	18	10	880

FORAGE CROPS

A precipitation of 3·66 inches in May as compared with 1·68 inches for an average of twelve years, made possible a hay crop and stood much in favour of higher yields in all other fodder crops. There was very little rainfall from early in June until the end of July, but roots, corn and sunflowers were able to withstand this and made rapid growth from the August rains.

HAY

Alfalfa, red clover, alsike clover, timothy and western rye grass have been tried under field conditions for twelve years. Alfalfa has never been a decided success and red and alsike clovers have always been failures. Timothy only produced a crop once. Western rye grass has been a failure so frequently that a perennial hay crop in this part of the province may be considered doubtful. Following is a statement of the yield per acre of western rye grass under field conditions since 1917:—

	1917	1918	1919	1920	1921	1922
	lb.	lb.				lb.
1 year after seeding	2,100	1,411	None	None	None	2,200
2 years after seeding	875	None	None	740	None	.....

It seems necessary to use grass to form a sod to prevent soil-drifting but from the standpoint of hay we have found it more profitable to grow green oats for hay than to grow western rye grass.

GRASSES AND CLOVERS—VARIETY TEST

In 1921 fourteen varieties of grasses and clovers were sown broadcast on one-tenth-acre plots and all made a good stand and wintered well. These were cut for hay when they reached the proper stage of maturity with the exception of White Dutch clover which was too short. The following table gives the resulting yields:—

GRASSES AND CLOVERS—VARIETY TEST

Name	Yield per acre			Date cut	Aftermath
	Height	Tons	Pounds		
	inch				
White sweet clover	42	2	1,600	June 30	Poor until late
Yellow sweet clover	36	2	590	June 19	Good
Brome grass	38	2	150	July 3	Good
Western rye grass	35	1	1,700	July 3	Fair
Variegated alfalfa	19	1	1,620	June 15	Very poor
Meadow Fescue	30	1	1,350	July 3	Poor
Timothy	30	1	850	" 3	Very poor.
Red Top	38	1	700	" 10	Fair
Grimm alfalfa	18	1	470	June 15	Very poor
Tall oat grass	40	1	220	June 15	Very good
Kentucky blue	21	.....	1,600	" 19	Very poor
Orchard grass	30	.....	570	" 19	Good
Canadian blue	18	.....	470	July 3	Very poor
White Dutch clover	.....	.....	.....	.....	Made thick growth throughout summer

The sweet clovers made very good growth and were cut when buds began to form. Though slightly lower in yield, the yellow variety was much finer and considerably earlier than the white. The yellow also revived much more quickly than the white and, though no second cutting was made, the aftermath was estimated at one ton per acre. The white did not make any second growth

until late in August and began to form buds when a few inches high. Brome grass and western rye grass both gave very good yields of good quality hay. The Brome started growth slightly earlier than the western rye and also produced a better aftermath. Of the two varieties of alfalfa grown Variegated gave the higher yield. Both plots were very thick and the winter of 1921-22 was particularly favourable, so that hardiness was not put to test. The thickness also partly accounted for the very little second growth. Meadow fescue gave a very good growth of hay but a poor aftermath. It is a very leafy grass and should make good hay. Timothy was rather thin and short with very little second growth. Red Top made an excellent growth but was the latest of the grasses. The second growth was fair. Tall oat grass started growth very early in the spring and was fit to cut by the middle of June. Though a good height, the stand was rather thin, which accounts for the low yield. The aftermath was exceptionally good and although not cut, was estimated to yield one ton to the acre. It was, however, allowed to seed so as to thicken up the present stand. The leafage is not very heavy but in appearance it resembles timothy in quality of hay. Kentucky Blue grass gave a very low yield but under our rather dry conditions it grows very short. It will never be a success as a hay crop in this locality. Orchard grass made a strong growth but was very thin, which would account for the low yield. The bottom growth of leaves was abundant. The hay was very coarse and not unlike slough grass. Canadian Blue was very short and fine and, while the hay was of excellent quality, the small amount produced would not warrant its growth for hay purposes. The aftermath was also poor, which would detract from its value for pasture purposes.

ANNUAL HAY CROPS

The object of this experiment was to determine at what stage it is best to cut oats for hay and also which variety of oats will give the highest yield.

Nine varieties of oats were sown in triplicate on one-fortieth-acre plots on May 2. These were all duplicated at the other end of the range, making six plots of each variety. The three stages of cutting were to be flowering, turning and nearly ripe. The weights were to be taken when dry enough to store for hay. Hubam and biennial sweet clover were also sown in duplicate to determine their value as annual hay crops.

The following table gives the yields of the various varieties at different stages of cutting:—

VARIETY TEST—OATS AS ANNUAL HAY

Variety	Cut July 21	Cut July 26	Cut Aug. 4	Average yield three cuttings	Remarks
	ton lb.	ton lb.	ton lb.	ton lb.	
Banner	3 960	3 400	3 300	3 553	Long heavy straw. Leafage abundant. Long heavy straw.
O.A.C. 72	3 420	3 500	3 100	3 340	Leafage abundant. Straw rather fine.
Gold Rain	3 20	3 100	3 640	3 253	Leafage abundant. Heavy straw, medium length.
Leader	3 ..	2 1,900	2 1,940	2 1,946	Leafage abundant.
Victory	2 1,660	2 1,080	2 960	2 1,233	Heavy straw and leaves.
Longfellow	2 1,340	2 1,040	2 1,760	2 1,380	Long, moderately fine stem. Leafage abundant.
Ligowo	2 1,160	2 1,200	2 800	2 1,055	Very course medium length straw. Leafage abundant. Long fine straw. Few leaves.
Alaska	1 1,960	2 640	2 420	2 340	Few leaves. Medium length fine straw.
Daubeney	1 1,200	2 180	1 1,900	1 1,760	Few leaves.
Average	2 1,413	2 1,449	2 1,424		

TEST OF SWEET CLOVER AS ANNUAL HAY

Variety	Height when cut	Date when cut	Yield	Remarks
	inch		ton lb.	
Hubam.....	30	Aug. 4....	2 100	Cut when half in bloom. Made a coarser hay than Biennial White Sweet Clover.
Biennial White Sweet Clover..	14	Aug. 4....	1 240	

With only one year's results, one cannot draw any definite conclusions as an average of several years is required for that purpose. With all the plots duplicated, however, the results should be fairly reliable for the current season. Approximately forty-five per cent of the varieties gave highest yields when cut July 26, thirty-four when cut July 21, and twenty-one when cut August 4. The fodder from cuttings made July 26 also appeared to be most palatable, the straw being green enough for good feed and the kernel partly filled. An average of the total yields of all the varieties, however, shows no significant difference in favour of cutting at any one of the three dates.

To draw some conclusions as to the best yielding variety, the yields at the three dates of cutting were averaged. Banner gave the highest average yield with O.A.C. No. 72 and Gold Rain very close. This was accountable in Banner by its heavy, long straw and abundant leafage. O.A.C. No. 72 resembled Banner considerably but Gold Rain is much finer in straw. Leader, Victory, Longfellow and Ligowo were similar to Banner in quality of feed produced. Alaska and Daubeney yield a very fine hay but lack leafage and quality. The hay from the last two cuttings, in all cases, was noticeably harder and less succulent. The yield from Hubam annual sweet clover was nearly double that of the biennial type though both were very short. The shortness may be due to the dry weather in July when they should have made their greatest growth. The Hubam hay was much coarser than the biennial, due to its greater height, fewer leaves and more advanced stage of maturity. The second growth was much the same in both, though the biennial type was thicker and the Hubam taller. The biennial was 8 inches and the Hubam 15 inches high when the plots were ploughed late in October.

ALFALFA FOR HAY

Alfalfa was sown by five different methods in 1921. Five plots were sown with a nurse crop of oats and five without and the whole duplicated, the duplicate plots to be left for seed. The object was to determine whether a larger yield could be obtained by sowing in rows and also whether a profitable catch could be made when sown with a nurse crop. The method of sowing and yields were as follows:—

ALFALFA FOR HAY

Plot No.	Sown with Nurse Crop 1921.			Alfalfa hay (1922)		
	Method of sowing	Yield per acre	Value of Nurse Crop at $5 per ton	Yield per acre	Value at $15 per ton	Total value per acre
		lb.	$ cts.	lb.	$ cts.	$ cts.
1	Broadcast	7,840	19 60	1,750	13 13	32 73
2	6″ drills	7,280	18 20	1,720	12 90	31 10
3	24″ "	8,260	20 65	1,680	12 60	33 25
4	30″ "	8,700	21 75	797	5 98	27 73
5	36″ "	9,860	24 65	1,422	10 67	35 32
Sown alone 1921—						
12	Broadcast			1,950	14 63	14 63
13	6″ drills			2,700	20 25	20 25
14	24″ "			1,560	11 70	11 70
15	30″ "			1,624	12 18	12 18
16	36″ "			1,503	11 27	11 27

The stand of alfalfa on plot No. 4 was very poor.

This year's results do not speak very strongly for alfalfa sown with large spacings between rows, but as we had a very wet May, the tendency would be for a larger yield from the thick sowing. July was very dry and the thin sowing showed a decided advantage. After cutting on June 30, the rows produced new shoots and made a very good aftermath. The thick sowing, however, made no growth until rain came in August.

ALFALFA FOR SEED

The plots left for seed were cut on October 10 and raked the following day. Threshing was done with an ordinary grain thresher on October 25. The thresher did not take more than fifty per cent of the seed from the pods though the concaves were set as closely as possible. To thresh alfalfa properly it is necessary to use a huller or a thresher fitted with ten or twelve rows of concave teeth and preferably with corrugated teeth. There were many green shoots among the ripe stalks when the cutting was done and the straw should make very fair feed.

The method of sowing and yields were as follows:—

ALFALFA FOR SEED

Plot No.	Sown with Nurse Crop 1921			Alfalfa seed (1922)		
	Method of sowing	Yield per acre	Value of Nurse Crop at $5 per ton	Yield	Value at 10c. per lb.	Total value per acre
		lb.	$ cts.	lb.	$ cts.	$ cts.
6	Broadcast	10,020	25 05	5	0 50	25 55
7	6″ drills	6,700	16 75	5	0 50	17 25
8	24″ "	5,660	14 15	105	10 50	24 65
9	30″ "	6,480	16 20	135	13 50	29 70
10	36″ "	6,600	16 50	142	14 20	30 70
Sown alone 1921—						
17	Broadcast			5	0 50	0 50
18	6″ drills			10	1 00	1 00
19	24″ "			85	8 50	8 50
20	30″ "			74	7 40	7 40
21	36″ "			81	8 10	8 10

The value of alfalfa seed has been set at 10 cents per pound as this was the minimum wholesale price in Saskatoon during 1922.

As can be seen by the table, a decided loss was sustained when no nurse crop was used. More seed was produced on the sowings with a nurse crop, with the exception of the 6-inch drills. Very little seed was produced on the thick sowings; that duty apparently being reserved for the outside plants. We can safely deduce that alfalfa for seed or hay can be most profitably grown with a nurse crop and that for seed we must resort to rows at least 24 inches apart. Sowing in 6-inch drills is nearly the same as broadcasting, as the plants spread out until it is hard to discern the rows.

SWEET CLOVER FOR HAY

Sweet clover was sown by five different methods in 1921. Five plots were sown with a nurse crop of oats and five without, and the whole duplicated. The duplicate plots were left for seed. The object was to determine whether a larger yield could be obtained by sowing in rows and also whether a profitable catch could be made when sown with a nurse crop.

The methods of sowing and yields were as follows:—.

SWEET CLOVER FOR HAY

Plot No.	Sown with Nurse Crop 1921			Clover hay, 1922		
	Method of sowing	Yield	Value of Nurse Crop at $5 per ton	Yield	Value at $10 per ton	Total value per acre
		lb.	$ cts.	lb.	$ cts.	$ cts.
1	Broadcast	6,920	17 30	3,500	17 50	34 80
2	6" drills	8,340	20 85	3,100	15 75	36 60
3	24" "	8,680	21 70	2,200	11 00	32 70
4	30" "	8,720	21 80	2,314	11 57	33 37
5	36" "	8,210	20 53	2,286	11 43	31 96
Sown alone 1921—						
12	Broadcast			7,700	38 50	38 50
13	6" drills			8,520	42 60	42 60
14	24" "			7,050	35 25	35 25
15	30" "			7,315	36 58	36 58
16	36" "			5,912	29 56	29 56

Sowing in rows was no advantage so far as tonnage of the first crop went, but the aftermath from them was decidedly superior to the thick sowing. The wet May was, no doubt, accountable for the high yield on the thick sowing. The yield of hay was over twice as much from the plots without a nurse crop as from those with it, but the feed was much superior where a nurse crop was grown the previous season. When the value of the nurse crop is taken into consideration, the returns are very much alike. Sweet clover has a tendency to grow large at any time and where no nurse crop was used it was very coarse and woody.

SWEET CLOVER FOR SEED

Half of the plots were allowed to seed and on September 16 were cut with a binder and set up in long stooks. They were threshed on October 20 with an ordinary grain thresher, the concaves being set as closely as they would run. Only about half of the seed was hulled and to make the remainder fit for seed it will have to be put through a scarifier or a huller. As clover seed is very hard it is usually scarified to increase the percentage of germination. In thresh-

ing the very long straw only the upper half of the sheaf was put into the cylinder. Holding back the heavy butt stalks prevents overloading of the sieves and allows for better and quicker separation. The straw would be of very little use as feed, being dry and woody.

The methods of sowing and yields were as follows:—

SWEET CLOVER FOR SEED

Plot No.	Sown with Nurse Crop 1921			Clover seed, 1922		
	Method of sowing	Yield per acre	Value of Nurse Crop at $5 per ton	Yield	Value at 7c. per lb.	Total value per acre
		lb.	$ cts.	lb.	$ cts.	$ cts.
6	Broadcast	8,330	20 83	180	12 60	33 43
7	6" drills	8,740	21 85	330	23 10	44 95
8	24" "	6,510	16 28	400	28 00	44 28
9	30" "	6,250	15 63	453	31 71	47 34
10	36" "	7,490	18 73	498	34 86	53 59
Sown alone 1921—						
17	Broadcast			320	22 40	22 40
18	6" drills			340	23 80	23 80
19	24" "			580	40 60	40 60
20	30"			414	28 98	28 98
21	36" "			437	30 59	30 59

SUNFLOWERS

There are many types of sunflower but few have been isolated sufficiently long to breed true. The first settlers in the Rosthern district brought seed from Russia 31 years ago and have propagated it every year since. This strain is early maturing but is made up of such types as single stem and branching, white, black and striped seeded, tall and short. In a test of many types all ripened seed and all were lower in yield than the Mammoth or Giant Russian, tall types sold by several seed houses but which are usually too late maturing to produce seed in this district. The Mammoth or Giant Russian is preferred for ensilage because of the much greater tonnage. Prolific White, Manteca and Brook's Dwarf are varieties being developed in southern Alberta. White Seed, Black Seed, Klaasen and Very Early are selections from types grown in the district around Rosthern. Following is a statement of yield of these varieties as grown on uniform plots. Six 68-foot rows of each were sown on April 27 and the crop was cut on September 9.

SUNFLOWERS—TEST OF VARIETIES

No.	Name	Source	Aver. height	Tallest	Stage of maturity	Yield per acre	Remarks
			In.	In.		Tons. Lb.	
1	Mammoth Russian	Commercial	82	132	36% in bloom	18 1,154	Very coarse heavy foliage
2	Giant Russian	McKenzies	76	120	36% in bloom	14 1,680	" "
3	Prolific White	Alberta	62	80	A few ripe heads	11 1,275	Coarse with large head
4	Manteca	"	62	75	A few ripe heads	11 207	" "
5	Brooks Dwarf	"	55	70	50% ripe	10 1,139	Coarse, short large head
6	White Seed	Rosthern	55	65	70% ripe	8 869	" "
7	Black seed	"	56	72	70% ripe	6 1,666	Moderately fine
8	Klaasen	"	45	55	90% ripe	5 1,530	Coarse very short
9	Very Early	"	40	50	95% ripe	5 463	" "

TIME OF SOWING SUNFLOWERS

Six 68-foot rows of Giant Russian sunflowers were sown each week from the 27th day of April to the 22nd day of June, on root land which was fallow in 1920. Each sowing was duplicated about 1,400 feet distant. The tabled results are the average of the two plots. Germination was much more rapid in the first and last three sowings than in the other five. As can be seen from the table, the best yield was obtained from the sowing of May 11. This plot also required the most time to sprout and come through the ground, though all sowings were made at the same depth. The sowing previous to this gave the second best results and also took a long time to germinate. We would judge that any of the first five sowings would have made good ensilage but the later ones were not mature enough. When very green the ensilage contains such an excess of moisture that the leakage from the silo is great.

TIME OF SOWING SUNFLOWERS

No.	Date of	Days coming up	Aver. height	Tallest	Stage of Maturity	Yield per acre
			inches	inches		tons lbs.
1	April 27th....	9	92	120	50% in bloom. Leaves dead 3½' up from ground	15 1,855
2	May 4th.....	12	92	125	45% in bloom. Leaves dead 3 up from ground	17 326
3	May 11th.....	14	92	117	30% in bloom. Leaves dead 2' up from ground.	19 1,022
4	May 18th.....	12	89	117	25% in bloom. Leaves dead 1' up from ground	16 1,293
5	May 25th.....	11	85	107	22% in bloom. Leaves dead ½' up from ground.	14 345
6	June 1st.....	10	83	97	6% in bloom. A few dead leaves at bottom...	14 1,467
7	June 8th.....	7	76	92	2 flowers. A few dead leaves at bottom.....	12 342
8	June 15th.....	6	71	84	Forming buds. Bottom leaves yellow.....	12 1,143
9	June 22nd.....	8	65	75	No buds. Heavy green foliage.....	11 1,085

INDIAN CORN—VARIETY TEST

Four rows each of fifteen varieties of Indian corn were planted on May 19. Planting was done with a grain drill after stopping sufficient runs to make the rows 36 inches apart. The plants in the rows were later thinned to about 8 inches apart. Fallow land was used and was in good state of cultivation when the corn was planted. Canada Yellow was grown from seed ripened at Rosthern in 1921 and ripe seed was again collected. Following is the table showing yields per acre calculated from the two 68-foot inside rows in each case:—

INDIAN CORN—TEST OF VARIETIES

No.	Name of Variety	Source of seed	Height	Stage cut	Yield per acre	Remarks
			inches		tons lbs.	
1	Wisconsin No. 7.....	.....	94	Kernels in late milk.....	23 1,617	
2	Leaming.....	.....	106	" "	21 1,026	
3	North Dakota.....	.....	87	Ears forming.....	20 1,424	
4	Compton's Early.....	.....	94	Kernels in early milk....	20 1,424	
5	Improved Leaming.....	.....	102	" " milk.....	20 1,041	
6	Longfellow.....	.....	94	" " early milk..	20 357	
7	North Western Red Dent..	Dakota Imp. Seed Co. of North Dakota	91	" " " "	19 1,823	
8	Golden Glow.....	.....	96	" " " "	19 1,289	
9	Canada Yellow.....	Rosthern.....	100	" " dough "	19 1,289	
10	Bailey.....	.....	92	" " " "	18 1,154	
11	Twitchell's Pride.....	Rosthern.....	98	" " late milk.....	18 940	
12	Dieco Yellow Flint.....	Dakota Imp. Seed Co., NorthDakota	55	" " dough.....	17 1,090	
13	White Cap Yellow Dent.....	.....	90	" " milk.....	16 1,951	Rosthern thin stand
14	Disco Pride Yellow Dent...	Dakota Imp. Seed Co., North Dakota	72	" " early dough...	16 1,204	
15	Disco 90 White Dent.....	" "	92	" " milk.....	15 748	Very thin stand

LOSS FROM EVAPORATION IN CORN AND SUNFLOWERS

Several varieties of corn and sunflowers were weighed when cut, and, after lying on the ground for forty-eight hours were weighed again, with the result that the corn was found to have lost 9.6 per cent weight and the sunflowers 14.5 per cent.

Two lots of sunflowers representing two stages of maturity were cut on September 11 and weighed immediately and every succeeding day for a week with the following results:—

SUNFLOWERS—LOSS FROM EVAPORATION

Date weighed	Cut in full bloom		Cut before bloom appeared	
	Weight lbs.	% shrinkage	Weight lbs.	% shrinkage
Sept. 11	100	.....	100	.....
" 12	92	8	93	7
" 13	85	15	86	14
" 14	81	19	83	17
" 15	80	20	82	18
" 16	75	25	74	26
" 18	67	33	61	39

FIELD CARROTS

Eight varieties of field carrots were sown on April 29 on manured summer-fallow, 36 inches between rows, and on June 16 were thinned to 6 inches between plants. Oxheart was evidently over-mature for many roots were split. The others were in good condition when dug on October 7. Following is table of yields. Two 68-foot rows were devoted to each variety:—

CARROTS—TEST OF VARIETIES

Number	Name of variety	Source	Description of variety	Yield per acre 1st sowing		Yield per acre 1st sowing	
				tons	lbs.	bush.	lbs.
1	Imp. Half Long White	McKenzies	Coarse, medium length, white	10	1,246	354	6
2	Long White Belgian	McKenzies	Coarse, long, white	10	1,033	350	33
3	Long White Belgian	Steele Briggs	Coarse, long, white	9	1,965	332	45
4	Danish Champion	Ottawa	Smooth, long, orange	8	976	282	56
5	Giant White Vosges	McKenzies	Coarse, long, white	6	1,773	229	33
6	Oxheart	Steele Briggs	Coarse, short, red	6	1,346	222	26
7	Long Red Surrey	McKenzies	Smooth, long, red	6	705	211	45
8	Long Orange Surrey	Steele Briggs	Smooth, long, orange	5	1,317	188	37

NOTE.—60 lbs. was used as weight of one bushel.

SUGAR BEETS

Four varieties of true sugar beets were tested this season. Four 68-foot rows of each variety were sown in duplicate, 36 inches between rows, on April 29. On June 20 the plants were thinned to about 12 inches apart. Following is the table showing yields per acre, calculated on the yields of the two inside rows in each case:—

SUGAR BEETS—TEST OF VARIETIES

Name of variety	Description of variety	Yield per acre 1st sowing		Yield per acre 1st sowing	
		tons	lbs.	bush.	lbs.
Denmark	White fibrous	16	456	540	56
British Columbia	White fibrous	16	350	539	10
Chatham	White fibrous	16	243	537	23
Waterloo	White fibrous	15	962	516	02

NOTE.—60 lbs. was used as weight of one bushel.

SWEDE TURNIPS

Seventeen varieties of swede turnips were sown on April 29, three weeks earlier than the fall turnips, and were harvested on October 9. Hall's Westbury has been grown on five-acre fields for seven years and is always satisfactory both in yield and quality. Following is a statement of yields taken on two 68-foot rows of each variety.

SWEDES—TEST OF VARIETIES

Number	Name of variety	Source	Remarks	Yield per acre 1st sowing		Yield per acre 1st sowing	
				tons	lbs.	bush.	lbs.
1	Superlative P. T.	McKenzies	Oblong, medium size, yellow with purple top	25	1,461	857	41
2	Ditmars	R.P. Ditmar	Round, medium size, yellow with green top	25	393	839	53
3	Hall's Westbury	McKenzies	Slightly oblong, medium, with purple top	24	258	804	18
4	Perfection	Steele Briggs	Round, medium, yellow with purple top	23	870	781	10
5	Good Luck Pr. T.	Steele Briggs	Slightly oblong, rather small, yellow with purple top	23	443	774	03
6	Bradstone, G.T.	McKenzies	Round, medium, white with green top.	23	122	768	42
7	Monarch	C.F. Nappan	Oblong, medium, yellow, with purple top	22	1,268	754	28
8	Jumbo	Steele Briggs	Oblong, medium, yellow with purple top	22	1,055	750	55
9	Bangholm	E. F. Charlottetown.	Oblong, medium, yellow with purple top	22	841	747	21
10	Durham	Steele Briggs	Oblong, rather small, yellow with green top	21	1,026	717	06
11	Imp. Hardy	Steele Briggs	Oblong, medium, yellow with purple top	21	386	706	26
12	Monarch	McKenzies	Oblong, medium, yellow with purple top	20	1,959	699	19
13	Bangholm Imp.	Steele Briggs	Oblong, rather small, yellow with purple top	19	1,503	658	23
14	Champion	Steele Briggs	Oblong, medium, yellow with purple top	19	1,076	651	16
15	Gloucester	Steele Briggs	Round, medium, white with green top.	19	435	640	35
16	Bangholm	McKenzies	Oblong, rather small, yellow with purple top	15	962	516	02
17	White Swede	McKenzies	Round, rather small, white with green top	13	798	446	38

NOTE.—60 lbs. was used as weight of one bushel.

DISTANCE OF THINNING SWEDE TURNIPS

Eighteen rows of Hall's Westbury turnips were sown in drills 3 feet apart on fallow land. On June 14 they were thinned to 6, 12 and 18 inches between plants, using six rows for each distance. On October 9 all were pulled and the

two middle rows of each six were weighed to determine the yield per acre. The same experiment had been carried on in 1921 and the two year's results are given in the following table:—

SWEDE TURNIPS—DISTANCE OF THINNING

Distance of thinning	1922		1921		Two-year average (1921-22)	
	tons	lbs.	tons	lbs.	tons	lbs.
6 inches	22	1,802	18	352	20	1,077
12 "	25	1,461	20	576	23	18
18 "	24	1,325	20	1,728	22	1,526

One great advantage of the wider thinning which is not apparent in the table is the larger roots. This considerably reduces the cost of harvesting.

FALL TURNIPS

Seventeen varieties were sown on May 22 in rows 36 inches apart and thinned to 12 inches in the rows. They were harvested on September 19. A few were over mature as indicated by cracks in the roots. Two 68-foot rows of each variety were grown. Following is the table of yields:—

FALL TURNIPS

No.	Name of variety	Source of seed	Remarks	Yield per acre			
				tons.	lbs.	Bush.	lbs*
1	Red Paragon	Sutton	Large, round, smooth, white with purple top	33	407	1,106	47
2	Flat Norfolk	Ewing	Medium, round, smooth and white.	32	59	1,067	39
3	Favorite Purple Top	Sutton	Medium, round, smooth, very firm, yellow with purple top	29	507	975	7
4	White Globe	Ewing	Large, round, smooth, firm and white	28	51	934	11
5	Pomeranian White Globe	Ottawa	Large, round, smooth and white	27	877	914	37
6	Hardy Green Round	Sutton	Medium, round, smooth, white with green top	26	1,275	887	55
7	Mammoth Purple Top	Steel Briggs	Large, coarse, round, white with purple top	26	1,275	887	55
8	Early Six Weeks	Sutton	Large, coarse, round and white	26	848	880	48
9	Devonshire Greystone	Ottawa	Large, coarse, round, white with green and purple top	25	1887	864	47
10	Ostersundom	Ottawa	Large, smooth, medium length, white with purple top	25	1,353	855	53
11	Purple Top Mammoth	Sutton	Large, coarse, round, white with purple top	25	926	848	46
12	Aberdeen Yellow Purple Top	Ottawa	Medium, course, round, yellow with purple top	22	734	745	34
13	Yellow Fanlsard	Ottawa	Long, smooth, firm, yellow with green top	22	414	740	14
14	Yellow Aberdeen Green Top	Ewing	Medium, smooth, round, white with yellow and green top	21	1,773	729	33
15	Bortfielder	Ottawa	Long, smooth, firm and yellow	21	1,560	726	00
16	Red Top Sharp Leaf	Ottawa	Medium, coarse, flat, white with purple top	21	172	702	52
17	Perfection Green Top	Sutton	Medium, smooth, round, firm yellow with green top	20	1,531	692	11

NOTE.—60 lbs. was used as weight per bushel of turnips.

DATES OF SOWING FALL TURNIPS

Fall turnips were sown at one-week intervals beginning May 25 and continuing to June 22. Four rows were sown at each of the five dates on fallow land, 36 inches between drills. All sowings appeared above ground in about four days but in the June 15 sowing there were many blanks, due to poor germination. As the soil was rather dry at this time, lack of moisture may have been the cause. Cultivation was carried on as necessary during the season and each planting was thinned to about one foot apart when they reached four inches in height. All were pulled on October 10 and the two middle rows of each four weighed to determine the yield per acre. The results are very erratic, making it difficult to draw any conclusions, particularly on one year's results.

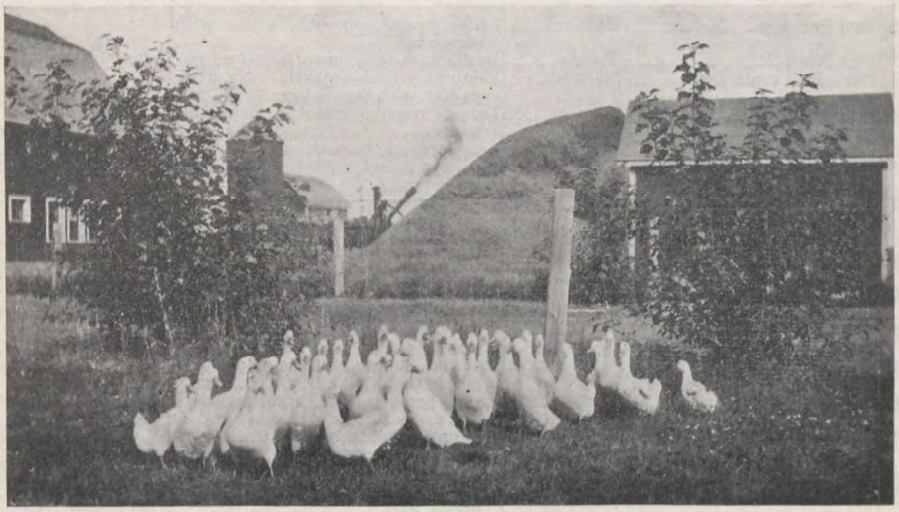
The following table gives the yield per acre of the different sowings:—

FALL TURNIPS—DATES OF SOWING

Date sown	Yield		Remarks
	tons	lbs.	
May 25	13	691	Medium size, poor quality, some decomposed.
June 1	10	1,780	Medium size, fair quality, a few blanks.
June 8	14	1,360	Medium size, good quality, some not mature.
June 15	9	577	Medium size, good quality, many not mature, many blanks.
June 22	10	179	Small, very firm, not mature.

POULTRY

The work on the poultry plant has progressed very satisfactorily. Previous to November 1, 1921, very little trap-nesting had been carried on but through-



Ducks are profiitable if sold at ten weeks of age.

out the poultry year just ended every bird's production has been recorded, with the result that an accurate system of elimination can be conducted, culling out all birds which do not produce a satisfactory egg yield. The mating of males

from high egg-producing parents, showing strong, healthy constitution and good breed type, with the high-producing females is practised, thereby raising each year the standard of individual and flock production.

STOCK ON HAND DECEMBER 31, 1922

Barred Plymouth Rock hens	105
Barred Plymouth Rock pullets	125
Barred Plymouth Rock cocks	4
Barred Plymouth Rock cockerels	12
	246
Mammoth Bronze Turkey toms	2
Mammoth Bronze Turkey hens	3
	5
White Pekin drakes	2
White Pekin ducks	8
	10

INCUBATION AND BROODING

Practically all incubation on this Station is done artificially. Several different standard makes of incubator are used, all lamp machines and heated either by hot air or hot water. While incubator manufacturers contend that the moisture requirements in their machines are taken care of by their regulation system, it is found advisable to use sand trays in them and to sprinkle the cellar floor with water occasionally. An incubator hygrometer is used and an endeavour made to keep the reading as close to 45 degrees F. as possible.

The brooding of chicks is done almost entirely by colony brooder stoves. These have been found to give the most satisfaction, being easy to operate and economical. Early in the season care should be taken to have a comfortable building in which to brood the chicks until they are three or four weeks old when they may be transferred, with the stove, to the portable colony house. When artificial heat is no longer required they may be moved, in the colony house, on to range and kept there until time to go into winter quarters.

Hatching results are given in the following table:—

HATCHING RESULTS FROM DIFFERENT MAKES OF INCUBATORS COVERING SAME PERIOD

Make of incubator	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number chicks alive July 1	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched
Buckeye	178	167	94	56	31·0	33·5	39	3·2	3·0
Cyphers	1,600	1,230	77	391	24·5	31·7	284	4·0	3·1
Tamlin	311	229	73	122	39·2	53·3	97	2·5	1·8

HATCHING FROM HENS VS. PULLETS

The results from hatching hens' eggs vs. pullets' eggs again emphasize the value of using year-old birds for breeding. The pullets included in the test were hatched in April and were well matured, but had laid more heavily througout the winter than had the hens.

HATCHING FROM HENS VS. PULLETS

Age of birds	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number chicks alive July 1	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched
Hens	403	353	87·5	176	43·5	50·0	86	2·29	2·0
Pullets	908	632	69·5	175	19·2	27·6	41	5·3	3·6

An experiment was conducted to determine the cost of rearing ducks to the age of eight weeks. Thirty-five birds, hatched June 12, were used in the experiment with the following results:—

Date	Total weight	Total gain	Average gain
	lbs.	lbs.	lbs.
June 12	2·9		
June 26	32·4	29·5	0·84
July 10	99·5	67·1	1·91
July 24	115·9	16·4	0·46
Total	115·9	113·0	3·21

Amount of mash consumed	388·5 lbs.		
Amount of milk consumed	564·75 "		
Cost of feed for 113 lbs. gain		$ 3.60	
Value of ducks at commencement at 20c. each		7 00	
Receipts from ducks, 115·9 lbs. at 30c.			$ 34·70
Total profit		24.10	
		$ 34.70	$ 34.70

Average profit per bird, 68 cents.

The mash as fed above was made up of two parts each of bran, oatmeal and barley meal with one-half part each of beefscrap and gravel.

EXTENSION AND PUBLICITY

During the year the superintendent addressed eighteen conventions and farmer's meetings and on Saturdays for the first three months of the year conducted classes in agriculture with school boys.

An Experimental Station exhibit was prepared and displayed at Prince Albert and Melfort Exhibitions.

During the summer there were seven picnics held at the Station. One picnic consisting of about four hundred visitors was held on July 25 but was not nearly so satisfactory as a number of smaller picnics. Visitors derive most benefit in visiting the Station by arranging to come in parties of between thirty and fifty. They can see the phase of work in which they are most interested and can receive proper supervision. In the case of the large picnic there is not an opportunity for all to ask questions of the officers in charge and many visitors go away without learning the answer to the question they came to have solved.

The policy adopted now is to have the residents of a given district make up a small party and visit the Station on a day agreed upon by mutual consent. The visitors bring their lunch and the Station provides tea, coffee and milk. The superintendent or some other responsible officer is able to give such parties his undivided attention with the result that visitors are in every case well pleased with the time spent.

A demonstration on killing and dressing poultry was held on the Station on December 19.

NEW BUILDINGS

The new buildings are the completion of a dairy cattle barn and a silo. The cattle barn is 36 by 50 feet and arranged to accommodate eighteen cows. The silo is round, 14 feet in diameter and extends into the ground 16 feet and above ground 16 feet. The structure below ground is cement and, above ground, staves.