DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION
SCOTT, SASK.

REPORT OF THE SUPERINTENDENT

M. J. TINLINE, B.S.A.

FOR THE YEAR 1922

The lawn, arboretum and flower garren, at the Dominion Experimental Station, Scott,

Printed by authority of the Hon. W. R. Motherwell, Minister of Agriculture, 1922

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1923

TABLE OF CONTENTS

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE SUPERINTENDENT, M. J. TINLINE, B.S.A.

SEASONAL NOTES, 1922

There was a total of 28¼ inches of snow during the winter of 1921-22. The early spring months were fairly moist and from May 9 to the 13, seeding operations, which had started about April 24, were delayed by rain. From May 15 to the end of July a drought set in, during which time only 1·44 inches of precipitation were recorded, whereas the normal precipitation for this period is 5·28 inches. Commencing with August 5, weather conditions improved and on August 16 a rainfall of 2 inches in 24 hours was recorded. Grain and hay crops that had given promise of vigorous growth during the early season were dwarfed; sunflowers, fodder corn, roots and crops that continue to grow during August and September made fair returns.

For this district, there was a fairly long season free from frosts, the first autumn frost occurring on September 9.

The month of September had the highest mean temperature on record at this Station for this period. Harvesting and threshing operations were finished in good season and the open fall permitted completion of all autumn farm operations. Live stock thrived well on the stubble fields which will mean a decrease in winter feed requirements. This is fortunate, as there is a serious shortage of feed grain in this part of the province, due to the dry summer.

METEOROLOGICAL RECORDS FOR SCOTT, 1922

Month	Temperature F			Precipitation				Total Sunshine
	Highest	Lowest	Mean	Rainfall	Snow-Fall	Total	Heaviest in 24 Hours	
				Inches	Inches	Inches	Inches	Hours
January	36·0	−47·8	0·57	.....	4·0	0·40	0·20	91·9
February	23·3	−32·8	5·58	.....	4·25	0·425	0·10	132·8
March	38·7	−18·8	15·55	.....	4·0	0·40	0·250	128·9
April	71·8	7·7	38·83	0·09	7·0	0·79	0·50	186·9
May	88·0	24·2	50·9	2·03	.....	2·03	0·58	260·9
June	87·7	31·4	58·67	0·87	.....	0·87	0·45	285·6
July	89·5	32·4	61·1	0·26	.....	0·26	0·20	333·2
August	98·2	36·2	63·28	3·04	.....	3·04	2·00	235·8
September	87·2	25·2	54·29	0·56	.....	0·56	0·28	217·3
October	70·2	15·9	39·5	0·81	1·80	0·99	0·42	147·2
November	53·2	− 7·8	25·15	.....	0·75	0·075	0·075	107·5
December	39	−32·8	6·44	0·20	3·50	0·55	0·30	78·8
Total for year	.....	.....	.....	7·86	25·30	10·390	.....	2,206·8

Latest damaging spring frost occurred on May 7, 1922	24·2°
First fall frost occurred on September 9, 1922	26·7°
Total precipitation for the four growing months of April, May, June and July, 1922	3·95 inches
Eleven years average precipitation for the four growing months of April, May, June and July	6·12 inches
Eleven years average annual precipitation	12·90 inches

54625—2

ANIMAL HUSBANDRY

HORSES

The horses on this Station, on December 31, 1922, consist of eight pure-bred Percherons, eleven grade work-horses and one driver.

Only a small amount of experimental work has been conducted with horses. The cost of raising grade horses has been determined as closely as possible by keeping records of feed, pasture, etc. This project was outlined in the previous report from this Station. A similar record is now being kept for pure-bred Percherons.

HORSE LABOUR

A record has been kept of all the labour performed by each horse and the cost of feed and care. From these records it has been calculated that each hour of horse labour cost 4·8 cents, while the actual value of horse labour is usually considered to be 10 cents per hour. The average hours of labour performed by each horse during the past year has totalled 1,615 which, at 10 cents per hour, amounts to $161.50. The cost of feed and care per horse totalled $77.61, which would leave a profit of $83.89 per horse, making no allowance for rent of shelter or interest on capital invested in horse, etc.

WHOLE OATS VS. OAT CHOP FOR HORSES

Object of Experiment.—To compare the value of whole oats and oat chop for horses during the winter months.

How Experiment was Conducted.—Ten horses were divided into two groups of five each. One lot was fed whole oats and the other lot was fed an equal quantity by weight of oat chop. On dividing the two lots, one horse was taken from each team for each lot in order that the work would be equally divided between lots. The experiment was started on December 1, 1921, and closed on March 29, 1922. Oat straw was used as roughage. The horses not required for work were placed on a prairie pasture during the day and stabled at night. The oats used were of good quality. The horses working received twelve pounds of grain per day and the idle horses eight pounds. The following table gives the results obtained:—

WHOLE OATS VS. OAT CHOP FOR HORSES

—	Whole oats	Oat chop
Number of horses in each lot	5	5
First gross weight ..... lbs.	7,550	6,940
First average weight ..... "	1,510	1,388
Final gross weight ..... "	7,460	6,995
Final average weight ..... "	1,492	1,399
Number of days in experiment ..... "	119	199
Average gain per horse ..... "	.....	11
Average loss per horse ..... "	18	.....
Difference per horse in 119 days—29 lbs.		

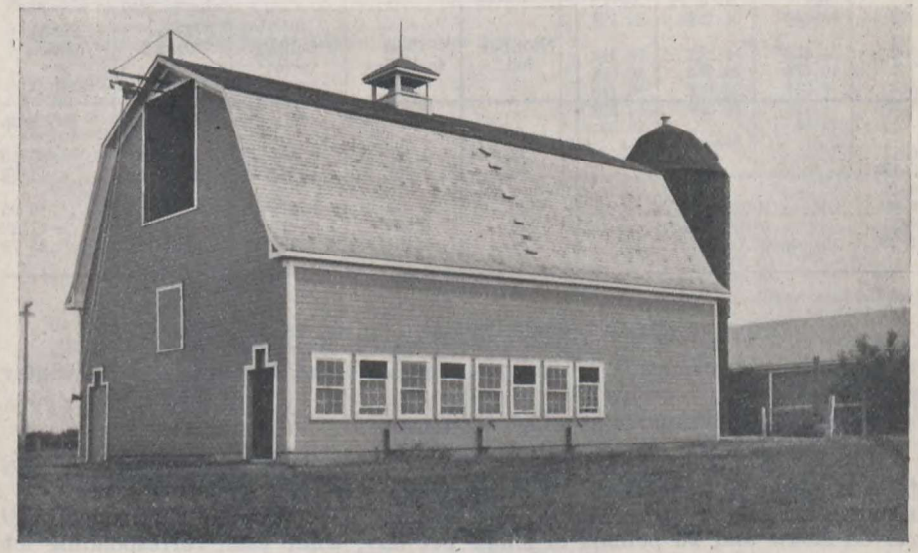
None of the horses was doing heavy work. If the same experiment were conducted during the summer, when all the horses were doing hard work and putting in long days in the field, it is only reasonable to believe that there would be a greater difference in the results in favour of the oat chop. When these horses are working on the experimental plots and fields during the summer where the grain crops are to be kept pure, whole grain cannot be fed.

The cost of crushing will vary with the size of crusher, the amount of grain to be crushed, etc., if the crusher is on the farm. If the grain is to be hauled some distance to be crushed, the cost of hauling and handling may be greater than the cost of crushing. If the price of oats is high the crushing would perhaps be more necessary than when the price is very low.

If a farmer has a crusher on his farm and is crushing feed for other stock, this experiment would indicate that the oats should be crushed for his horses, but if there is not enough stock on the farm to justify the purchase of a crusher, the several factors mentioned above may make it unprofitable to have the oats crushed for the horses.

CATTLE

The breeding herd on this Station at present is made up of Shorthorns. During the past year seven additional cows and three calves were received from the Dominion Experimental Farm at Indian Head, Sask., and one bull from the Brandon Experimental Farm. The breeding herd now totals twenty-three head. In addition there is one car of steers being fed during the winter.



Cattle Barn, Scott.

Milk records are kept for each cow. The highest Shorthorn record among those cows which have been on this Station for one year is 7,716 pounds for the twelve months of her first lactation period and, at the end of twelve months, this cow is giving twelve pounds per day. During the summer the milch cows are on a prairie pasture and receive about six pounds of oat chop per day. During the winter they are kept in a well-constructed barn except on warm days when they are turned out in the lot for a few hours. The winter grain ration is made up of five parts oat chop, three parts linseed meal and two parts bran. The quantity fed varies from ten to fifteen pounds per day, according to the individual, and the amount of milk she is giving. The roughage consists of sunflower silage and tame hay.

STEER FEEDING

The feeder steers are purchased locally when it is possible to get a sufficiently uniform lot. They have been secured locally four different seasons. When this cannot be done they are usually procured from the Edmonton Stock Yards.

PROFITS FROM WINTER FEEDING

Many farmers who are in a position to feed steers during the winter are in doubt as to the wisdom of the venture from a financial point of view. Hundreds of unfinished cattle are sold each fall on a low market and often from the same farm both cattle and feed grain are sold at low prices. Good results have been obtained by feeding steers in a straw shed which is not out of the reach of any farmer. It is generally considered that a spread of two cents between purchase and selling price results in a reasonable profit. The average spread realized at Scott in the past five years has been 2·42 cents including the year 1920-21, when the selling price was below the purchase price owing to the depreciation in values from war time to normal prices. This is the only year when steers have been fed at a loss on this Station. Including the year just referred to, the average for five years shows a profit of $16.17 per head, labour and interest excluded. The table below shows the profit or loss for each year:—

RETURNS FROM STEER FEEDING—FIVE-YEAR AVERAGE

Year	Number fed	Cost including feed	Selling price	Total Profit or loss	Profit or loss per animal
		$ cts.	$ cts.	$ cts.	$ cts.
1916–17	38	3,158 77	4,114 38	955 61	25 15
1917–18	19	1,897 74	2,235 54	337 80	17 77
1918–19	None fed				
1919–20	20	2,623 83	3,008 88	385 05	19 25
1920–21	20	2,009 86	1,773 71	236 15	−11 80
1921–22	24	1,191 37	1,706 18	514 81	25 74

TWO-YEAR-OLDS VS. YEARLINGS AND SILAGE VS. NO SILAGE

Object of Experiment.—To compare yearlings and two-year-olds as winter feeders.

To determine the value of silage for steers.

How Experiment was Conducted.—Twelve two-year-old steers were divided into two lots of six each and twelve yearlings were divided in the same way, making four lots in all. One lot of two-year-olds and one lot of yearlings received straw and 20 pounds of silage per day, while each corresponding lot received only straw for roughage. The same grain ration was fed to all the yearlings, which was about two pounds per day per head less than was fed to the two-year-olds. The two-year-olds all received the same grain ration.

YEARLING STEERS VS. TWO-YEAR-OLDS—ENSILAGE VS. STRAW

—		Yearlings		Two-year-olds	
		Ensilage fed	Straw fed	Ensilage fed	Straw fed
Number of steers in lot		6	6	6	6
First gross weight	Lbs.	4,585	4,500	6,370	6,495
First average weight	"	764	750	1,062	1,082
Finished gross weight	"	6,090	5,920	7,820	7,600
Finished average weight	"	1,015	987	1,303	1,266
Total gain	"	1,505	1,420	1,450	1,105
Average gain per steer	"	251	226	241	184
Average daily gain per steer (159 days)	"	1·5	1·4	1·5	1·1
Quantity of oats consumed	"	4,958	4,958	6,191	6,191
Quantity of oat straw consumed	"	6,666	7,332	7,332	8,000
Quantity of barley consumed	"	2,266	2,266	2,973	2,973
Quantity of wheat straw consumed	"	3,333	3,666	3,666	4,000
Quantity of pasture consumed		$3.00	$3.00	$3.00	$3.00
Quantity of hay consumed at $6 per ton	Lbs.	375	375	375	375
Quantity of silage consumed	"	12,260	.....	12,260	.....
Gross cost of feed, and pasture	"	$112.02	$81.86	$131.91	$101.76
Average cost of feed per steer		$18.67	$13.64	$21.99	$16.96
Feed cost of 1 lb. of gain		7·4c.	5·7c.	9c.	8·9c.
Average value of steers in autumn		$22.92	$22.80	$42.46	$43.30
Average value plus cost of feed of steers at conclusion of experiment		$41.59	$36.44	$64.45	$60.26
Average selling price per steer		$63.94	$57.02	$85.82	$77.86
Average increase in value		$41.02	$34.22	$43.36	$34.56
Average profit per steer		$22.35	$20.58	$21.37	$17.40
Value of silage per ton		$6.67	.....	$9.29	.....
Grain required per lb. gain	Lbs.	4·8	5·3	6·3	8·2

Prices charged for feed:—

Oats	$0.01 per lb.
Barley	$0.01 "
Silage	$5.00 per ton
Straw (oats and wheat)	$1.00 "
Hay (prairie wool)	$6.00 "
Pasture	$1.50 per head per month

The yearling steers were bought for three cents per pound and the two-year-olds for four cents. The average selling price per pound for the yearlings was 6·04 cents and for the two-year-olds 6·36 cents per pound. The yearlings gained an average of 238 pounds per steer and the two-year-olds an average of 212 pounds per steer. The silage was worth $2.62 per ton more when fed to the two-year-olds than when fed to the yearlings. Grain required per pound of gain shows the silage to save grain in the case of both yearlings and two-year-olds.

LOSS FROM DEHORNING

Object of Experiment.—To determine the loss from dehorning just before the fattening period to show the necessity of dehorning while young.

How Experiment was Conducted.—For a number of years steers dehorned just before going into the feed lot have been compared with muleys. Weights are taken at the time of dehorning and usually every month during the feeding period. A summary for several years is shown below:—

LOSS FROM DEHORNING

—	Dehorned	Hornless
Number of steers	35	17
Average gain per steer during first month	32·6	59·9
Average gain during feeding period	186·3	231·1
Average difference in gain per head during feeding period	.....	44·8

The practical stockman knows how undesirable it is to have a feeder steer with long horns in the lot. In shipping a car of steers, an animal with horns causes considerable trouble and is hard to sell. Hence it becomes almost imperative that steers be dehorned before feeding for market if the highest returns are to be realized. From a humane point of view alone, the wisest plan would be to use caustic potash when the calf is about two weeks old, or to dehorn while young. The figures above show an average difference in gain of 44·8 pounds per head in favour of the hornless steer. This difference at six cents per pound means $2.68 per head realized as a result of having the animal hornless and fully recovered from the operation before entering the feed lot. This would mean a difference of $53.60 on a car of twenty steers.

Further particulars regarding steer feeding are given in Pamphlet No. 17—New Series, which may be obtained on application to the Publications Branch, Department of Agriculture, Ottawa.

SHEEP

During the past year considerable interest has been shown in the sheep industry in this part of the province. The price of wool has been reasonable and dressed carcasses have always been in demand.

At this Station the loss of lambs from goitre has been rather high and the coyotes and dogs have killed a few lambs, but, notwithstanding these difficulties, the year has been successful from a financial point of view. Several experiments have been carried out which will be of special interest to sheepbreeders. The sheep kept at this Station are mostly grade Shropshires. A few purebred Cheviot and Shropshire ewes are included in the flock and pure-bred Shropshire, Cheviot, and Rambouillet rams are used for cross-breeding work and for grading up a representative grade flock of each of the three breeds mentioned, by continued use of pure-bred sires.

In cross-breeding work, the quality and weight of wool clip and the quality and conformation of the lambs make up the chief points of comparison. Wool samples from the first two shearings are mounted on cards for permanent records with the eartag number and the breeding of the lamb marked on each card.

In 1922, thirty-six grade Shropshire ewes were divided into three lots of twelve each, for breeding. A different breed of sire was used for each lot. The table below shows the comparative results obtained:—

CROSS-BREEDING EXPERIMENT

——	Shropshire sire	Cheviot sire	Rambouillet sire
Number of ewes (grade Shropshire)	12	12	12
Number of lambs born	18	18	19
Number of lambs living at 7 months	14	11	15
Average weight at birth ..... Lbs.	7·8	8·3	8·5
Average weight at 7 months ..... "	70·1	79·9	79·6
Total weight of living lambs at 7 months	982	959	1,196

It will be noted that the eleven cross-bred Cheviot lambs weighed within 23 pounds of the fourteen grade Shropshire lambs and that the average weights at seven months show a difference of over nine pounds per lamb in favour of the cross-breds. There seems to be also a definite relation between the weight at birth and the weight at the age of seven months. The increased size of the cross-bred lambs is perhaps due to the cross-breeding rather than to any property of the Cheviot or Rambouillet breeds, for it is a recognized fact that cross-breeding often increases size in the first cross.

LAMB FEEDING EXPERIMENT

Object of Experiment.—To determine the value of sunflower silage and of roots as succulent feeds for fattening lambs in winter.

To determine the profitableness of winter feeding of lambs.

How Experiment was Conducted.—Three lots of lambs were placed in similar quarters; all feeding was done inside. There were thirteen lambs in each lot. A pen was provided for an outside run, the amount of space both outside and in was the same for each lot of lambs. Each lot received the same ration of grain with oat straw. Lot 1 received silage and lot 2 received roots in addition to the grain and oat straw, while lot 3 was used as a check, receiving no succulent food.

The grain ration was made up in the following proportions: oats, 180 pounds; barley, 90 pounds; bran, 30 pounds; and oil-cake meal, 18 pounds—approximately one pound of this mixture was fed per day per head.

The following table shows the total quantity of grain, silage, and roots consumed and the resultant gains:—

LAMB FEEDING EXPERIMENT

—		Lot 1 Silage	Lot 2 Roots	Lot 3 Grain only
Number of lambs in lot		13	13	13
First gross weight (Jan. 4)	Lbs.	997	991	1,001
First average weight	"	76·6	76·2	77
Finished gross weight (March 16)	"	1,165	1,113	1,101
Finished average weight	"	89·6	85·6	84·6
Total gain in 71 days	"	168	122	100
Average gain per head	"	12·9	9·3	7·6
Average daily gain per head	"	·18	·13	·10
Amount of oats eaten	"	588	588	588
Amount of barley eaten	"	283	283	283
Amount of oil-cake eaten	"	57	57	57
Amount of bran eaten	"	100	100	100
Amount of silage eaten	"	511	.....	.....
Amount of turnips eaten	"	.....	502	.....
Amount of oat straw eaten	"	1,750	2,625	2,625
Total cost of feed	$	14.42	15.71	14.45
Average cost of feed per head	$	1.11	1.21	1.11
Feed cost per pound gain	$	0.085	0·128	0·144
Number of pounds of meal per 100 lbs. gain		611·9	842·6	1,028

Prices charged for feeds:—

Oats	32c. per bushel
Barley	35c. "
Oil-cake meal	$2.50 per cwt.
Bran	1.50 "
Silage	5.00 per ton
Turnips	5.00 "
Oat straw	3.00 "

It will be noted that the total cost of feed for lots 1 and 3 was about the same. The extra straw eaten by the check lot amounted to about the same in value as the silage fed to lot 1, but the total gain per head was 5·3 pounds greater in case of the silage lot.

Perhaps the cost per pound of gain is of foremost importance. The cheapest gains were made by combining silage with the regular ration and less straw was eaten than by either of the other lots. The experiment showed again that adding roots to the ration does not decrease the amount of straw consumed.

From the amount of grain required per hundred pounds gain, in the lot receiving grain only, and by considering the extra gains produced by the use of silage, it has been calculated that the silage was worth $12.17 per ton, while the actual cost of production was $5 per ton, including labour. The cost of labour has not been considered in any part of the lamb-feeding experiment.

Conclusions.—Lambs may be profitably fattened in winter.

Silage saves both straw and grain in producing equal gains.

Turnips decrease the cost per pound gain but are not as valuable as silage.

The use of either roots or silage will increase the profits from winter fattening.

GOITRE EXPERIMENT

Object.—To determine the value of potassium iodide fed to ewes as a preventive of goitre in young lambs, and to ascertain whether anything may be gained by the feeding of a specially prepared ration or by compulsory exercise.

Procedure.—The entire breeding flock was divided into four lots.

Lot 1 received oats and oat straw and common salt.

Lot 2 received oats and oat straw with potassium iodide fed in the salt.

Method of Preparation

For 100 pounds of salt two pounds of potassium iodide is required.

Spread the salt out in a warm room until it is thoroughly dried; dissolve the potassium iodide in warm water, about one quart of water for each pound of potassium iodide. Stir and keep warm until crystals have entirely dissolved. Sprinkle this solution over the dry salt and mix thoroughly. Keep the salt before the flock in a box or trough, preferably inside the shed.

Lot 3 received oats, bran, oil-cake, sunflower silage, straw, tame hay (western rye and brome), and common salt.

Lot 4 received oats, oat straw and common salt. This lot was fed about one hundred yards from the shed three times per day, which provided an unusual amount of exercise as compared with the other lots.

POTASSIUM IODIDE, SPECIAL RATION AND EXERCISE

—	Check	Iodide	Special ration	Exercise
Number of ewes in lot	23	22	22	22
Average weight of lambs at birth ..... Lbs.	7·4	8·2	7·7	6·8
Percentage of lambs affected with goitre ..... %	38	None	38	45
Percentage of lambs born in proportion to number of ewes ..... %	147	154	154	140

It will have been noted from the table that the lambs from the iodide lot were larger at birth. In addition to this, the lambs were stronger and required very little attention. The lambs from the other lots often showed a lack of wool on different parts of the body. Some were born without wool and were either dead or so weak that death followed in a few hours.

As a rule a lamb affected with goitre has a swelling in the throat (thyroid gland), but this is not always the case, and often a lamb with a very large gland will live longer than one having a very small swelling. The location rather than the size of the swelling seems to determine its seriousness.

Potassium iodide is being fed again during the winter of 1922-23 in comparison with a check lot receiving the same ration with common salt.

SWINE

On December 31, 1922, the swine on this Station numbered forty-six. Twenty-five of these are fall pigs and the remaining twenty-one make up the breeding stock. The greater part of these are Yorkshires, but a few Berkshire sows are kept for cross-breeding work, also Berkshire and Duroc-Jersey boars.

CROSS-BREEDING

In this work a pen of each breeding has been fed from the age of about ten weeks until ready for market. The Yorkshire lot was the only lot of pure-breds. The cross-breds used were the progeny from a Yorkshire sire and Berkshire dam (Yorkshire-Berkshire)—Berkshire sire and Yorkshire dam (Berkshire-Yorkshire)—Duroc-Jersey sire and Yorkshire dam (Duroc-Yorkshire)—Duroc-Jersey sire and Berkshire dam (Duroc-Berkshire). Both sire and dam were pure-bred in every case.

Object of Experiment.—To compare the several lots of cross-bred swine and pure-bred Yorkshires as feeders.

How Experiment was Conducted.—The five lots used were placed under identical conditions and fed the same mixture of grain. The quantity fed each lot was the same per head at the beginning of the experiment but later it was found that some lots would consume more than others. The quantities of feed each lot consumed are shown in the table below:—

CROSS-BREEDING—FEEDING EXPERIMENT

—		York-Perk.	Perk-York	Pure-bred York	Duroc-York	Duroc-Perk.
Number in each lot		4	8	8	8	8
First weight gross	Lbs.	232	409	392	409	410
First average weight	"	58	51	49	51	51
Final weight gross	"	659	1,205	1,155	1,086	981
Final average weight	"	139	150	144	135	122
Number of days in experiment		100	100	100	100	100
Total gain for 100 days	Lbs.	427	795	763	676	571
Average daily gain each	"	1·06	·99	·95	·84	·71
Average daily gain per lot	"	4·27	7·95	7·63	6·76	5·71
Pounds of meal consumed	"	1,795	3,574	3,691	3,574	3,387
Pounds of buttermilk consumed	"	409	918	918	918	918
Total cost of feed	$	22.44	45.72	46·15	45.72	43.91
Cost of feed per head	$	5.61	5.71	5·76	5.71	5.48
Feed cost per pound gain	$	·0525	·0575	·0604	·0676	·0769
Pounds of meal per 100 lbs. gain	Lbs.	420	449	470	528	593

Prices charged for feeds:—

Oats	40c. per bushel
Barley	47c. "
Rye	75c. "
Shorts	$29.00 per ton
Buttermilk	¼c. per pound.

The York-Berk cross has given the highest returns in this experiment. This may be partly due to the fact that there were only four of this breeding available and that their pen was the same size as the pens where eight were confined. This cross was also slightly larger when the experiment was started as these pigs were from smaller litters. However, in a similar experiment one year previous, this same cross gave the highest returns with neither of the above mentioned factors existing. It should also be stated here that some experimentalists have realized higher returns from the pure-bred Yorkshires and the Berkshire-Yorkshire cross, but this may be accounted for in part by a possible difference in the general quality of the parent herds even though pure-bred. The Duroc-Jersey crosses are the two lowest under test and especially has the Duroc-Berkshire cross proved to be rather an unprofitable feeder, seeming to fatten rather than grow and not to eat as much as the other lots, as the above table shows.

Cross breeding experiments should include some information as to the prolificacy of each breed in question. The following table gives the numbers in litters resulting from each cross or from pure-bred Yorkshires and Berkshires. All sows farrowing spring litters on this Station during the past two years have been included. The Duroc-Jersey sire has been used only one season thus far.

COMPARISON OF LITTERS—1921 AND 1922

Pure-bred Yorkshires, number in litter	Pure-bred Berkshires, number in litter	Yorkshire sire Berkshire dam, number in litter	Berkshire sire York dam, number in litter	Duroc. sire Yorkshire dam, number in litter	Duroc. sire Berkshire dam, number in litter
9	5	7	5	6	11
11	3	4	10	8	9
12	6	8	8	9	.....
9	6	11	6	.....	.....
3	2	.....	8	.....	.....
9	.....	.....	9	.....	.....
10	.....	.....	.....	.....	.....
Aggregate 53	22	30	46	23	20
Average 9	4·4	7·5	7·6	7·6	10

This test should be averaged from a greater number of sows before conclusions are definitely drawn, for in drawing final conclusions from these few litters there would be a danger of a cross or breed being criticized too severely as a result of one or two less prolific individuals. However, these records continued from year to year will constantly become more conclusive as different individuals will be added and some of the original individuals will be disposed of each year.

CRUSHED GRAIN VS. WHOLE GRAIN FOR GROWING PIGS

Object of Experiment.—To compare crushed grain with whole grain for growing pigs and to determine whether or not the difference in gains will pay for the crushing.

How Experiment was Conducted.—Twelve pigs were divided into two lots of six each. One lot received the dry grain whole and the other received the grain crushed. The grain mixture consisted of one part barley and three parts oats at the beginning of the feeding period and the proportion of barley was gradually increased until, near the end of the experiment, the mixture consisted of half oats and half barley. A small amount of oil cake meal was added to the ration of both lots near the end of the experiment.

WHOLE GRAIN VS. CRUSHED GRAIN

——		Whole grain	Crushed grain
Number in each lot	.....	6	6
First weight (gross)	Lbs.	248	260
First average weight	"	41·3	43·3
Final weight (gross)	"	757	876
Final average weight	"	126	146
Number of days in experiment	.....	120	120
Total gain for 120 days	Lbs.	509	616
Average gain each	"	84·8	102·6
Average daily gain each	"	·70	·85
Pounds of feed consumed	"	3,371	3,333
Cost of crushing feed	$	.....	2·41
Total cost of feed (including crushing)	$	38.66	41.71
Feed cost per pound gain	$	·0758	·0677
Pounds of feed required for 100 lbs. gain	Lbs.	662	541

Price of feeds:—
Oats..... 40c. per bushel
Barley..... 47c. "
Oil-cake meal..... $2.75 per hundred.
Cost of crushing:—
Oats..... 2.3c. per bushel
Barley..... 4·6c. "

These hogs were fed for a time after the close of the experiment before being sold but could have been sold as shop hogs at the end of the experiment for $8 per hundred. By referring to the total gains in the table above a difference of 107 pounds in favour of the lot receiving chop will be noted. This difference at $8 per hundred amounts to $8.56 in favour of the lot receiving chop. The total cost of crushing the feed was $2.41 which, when deducted from the $8.56, leaves $6.15 gained by feeding crushed grain to six pigs rather than the whole grain, or $1.02 per head in a 120 days period, or eight-tenths of one cent per day per pig in favour of feeding crushed grain. The cost of crushing as shown above does not include hauling to and from the crusher. If the crusher is not on the farm, an additional item of cost for the hauling should be considered.

At the close of the experiment, the whole grain lot was fed chop well moistened with water. This resulted in a very rapid gain and would indicate that, should a farmer not be in a position to feed crushed grain during the entire feeding period, he would be well repaid to go to considerable expense to procure chop for finishing.

SELF-FEEDER VS. TROUGH

Object of Experiment.—To compare the self-feeder and the trough as profitable methods of feeding growing and fattening swine.

How Experiment was Conducted.—One lot of pigs were fed three times per day and given as much as was considered wise. The other lot was given access to the feed in the self-feeder and water was kept in a trough near by.

SELF-FEEDER VS. TROUGH

—		Trough	Self-feeder
Number in each lot		6	6
First weight (gross)	Lbs.	260	260
First average weight	"	43·3	43·3
Final weight (gross)	"	876	1,056
Final average weight	"	146	176
Number of days in experiment		120	120
Total gain for 120 days	Lbs.	616	796
Average gain each	"	102·6	132·6
Average daily gain each	"	·85	1·10
Pounds of feed consumed	"	3,333	4,730
Total cost of fe d	$	39·30	55·90
Feed cost per p und gain	$	·0638	·0702
Pounds of meal required for 100 lbs. gain	Lbs.	541	594

Cost of feeds:—

Oats	40c. per bushel
Barley	47c. "
Oil-cake meal	$2.75 per hundred

The lot on the self-feeder consumed more feed and made greater gains but the gains were not sufficiently great in proportion to the food consumed to make the method of feeding as profitable as the trough feeding. In several tests made at this Station in past years the self-feeder has proved more profitable but in this case the trough feeding has given greater returns. The cost of labour is not usually calculated in this experiment, but if it were, the results even in this test would probably be in favour of the self-feeder.

BARLEY VS. RYE FOR GROWING SWINE

Object of Experiment.—To compare barley and rye as feeds for growing swine.

How Experiment was Conducted.—The feed for each lot of pigs was made up of three parts oat chop and one part of barley or rye. The proportion of the barley for the one lot was gradually increased at the same rate as the rye for the other lot until equal parts with oat chop were fed in each case. A small quantity of oil cake meal was added to the ration of each lot near the end of the experiment.

BARLEY VS. RYE FOR SWINE

—		Rye	Barley
Number in each lot		6	6
First weight (gross)	Lbs.	260	260
First average weight	"	43·3	43·3
Final weight (gross)	"	838	876
Final average weight	"	139	146
Number of days in experiment		120	120
Total gain for 120 days	Lbs.	578	616
Average daily gain	"	96·3	102·6
Average daily gain each	"	·80	·85
Pounds of feed consumed	"	3,333	3,333
Total cost of feed	$	42.40	39.30
Feed cost per pound gain	$	·0733	·0638
Pounds of meal required for 100 lbs. gain	Lbs.	576	541

Price of feeds:—
Oats —40c. per bushel or 1·17c. per pound
Barley —47c. " ·97c. "
Rye —75c. " 1·33c. "
Oil-cake meal—$2.75 per hundred.

It will be noted that the difference in gain per pig for 120 days was only five pounds. This was in favour of the barley which was cheaper feed and, since not so much was required to produce 100 pounds gain, it has proved to be the more profitable feed in this instance. Rye chop has a sticky property and, when fed alone, is thus objectionable unless fed with an abundance of water. However, when used to make up not more than half the meal mixture, this property has not been objectionable when fed with a reasonable quantity of water.

There is a question as to what proportion of rye chop could be successfully used in the self-feeder, dry. During the past summer as much as one-quarter rye chop was fed with oat chop through the self-feeder to a few store pigs but not in comparison with any other mixture of feeds.

In deciding between barley and rye as a feed for growing and fattening swine, the price of each will perhaps be the determining factor. In this experiment with growing pigs, barley has given greater gains, pound for pound, while one year ago the experiment was conducted with fattening swine only and the rye gave greater gains. There is a possibility that the rye may be more successfully used for finishing while barley may be more satisfactory for the growing period.

The test should be repeated both for young growing pigs and pigs being finished for market.

BUTTERMILK FOR GROWING PIGS

Object of Experiment.—To determine the value of buttermilk for feeding growing pigs.

How Experiment was Conducted.—Twelve pure-bred Yorkshire pigs were divided into two lots as evenly as possible. The grain ration was in each case

composed of oat and barley chop and shorts fed in a trough with water. The same quantity was fed each lot. The one lot received, in a separate trough, seven pounds of buttermilk per pig per day in addition to the regular ration. Both lots were fed three times per day.

BUTTERMILK FOR GROWING PIGS

—		Buttermilk	Check
Number of pigs in lot		6	6
First gross weight	Lbs.	214	215
First average weight	"	35·6	35·8
Final gross weight	"	543	387
Final average weight	"	90·5	64·5
Number of days in experiment		43	43
Total gain for period	Lbs.	329	172
Average gain per pig	"	54·8	28·6
Average daily gain per group	"	7·6	4·0
Total cost of feed per group	$	14.08	9.66
Average cost of feed per group	"	2.34	1.61
Amount of meal mixture required for one pound gain	Lbs.	2·5	4·7
Feed cost to produce one pound gain	c.	4·2	5·6

Price of feeds used:—

Oats	1·17c. per lb.
Barley	·83c. "
Shorts	1·45c. "
Buttermilk	¼c. "

It was not possible to carry this experiment until the pigs were ready for market owing to a shortage of buttermilk. However, it will have been noted that the buttermilk lot gained 3·6 pounds per day more than the other lot, or ·6 of one pound per pig. The cost per pound gain was 1·4 cents lower in the case of the buttermilk lot and, in addition, this lot would be ready for market some time before the other lot which would result in a further saving of grain.

From this experiment it is evident that buttermilk at ¼-cent per pound is a very profitable addition to the grain ration when feeding growing pigs in a dry lot.

In order to compare the gains made by each lot under different conditions after the buttermilk was discontinued, three from each lot were placed in a rape pasture and the remaining three from each lot were placed together in the same dry pen. Both lots were fed through a self-feeder and the same mixture of grains was used. The following table shows the gains made after the buttermilk was discontinued:—

THE CONTINUED EFFECT OF BUTTERMILK—PASTURE LOT

—		On pasture after discontinuing buttermilk	
		No. buttermilk Lot	Buttermilk Lot
Number of days under test after buttermilk was discontinued		68	68
Average gain per pig	Lbs.	69	73
Increased gain per pig resulting from previously-fed buttermilk	"	.....	4

During the sixty-eight days after the buttermilk was discontinued, the buttermilk lot held their increased weight gained during the time which they were getting buttermilk and in addition gained four pounds per pig more.

In the table below, the gains made in the dry lot are shown. The pigs which previously received buttermilk have again held their additional weight put on while getting buttermilk and gained thirteen pounds per head more than the pigs in the same pen which had never received any buttermilk.

THE CONTINUED EFFECT OF BUTTERMILK—DRY LOT

	In dry lot after discontinuing buttermilk	
	No buttermilk Lot	Buttermilk Lot
Number of days under test after buttermilk was discontinued	68	68
Average gain per pig ... Lbs.	37	50
Increased gain per pig resulting from previously fed buttermilk ... Lbs.	.....	13

It will thus be seen that when the pigs were placed under identical conditions, those which had never received any buttermilk failed to recover their lack of gain nor could they even hold their own with those which received buttermilk for forty-three days earlier in the summer.

WINTER HOUSING OF SWINE

Object of Experiment.—To compare a cheap hog cabin with a well-built piggery as winter quarters for swine.

How Experiment was Conducted.—Eight pigs from the same litter were divided into two groups of four each. One lot was kept in the piggery which was ceiled inside and comparatively warm. A small run was provided on the south side of the building. The other lot was fed the same ration outside and allowed to sleep in a portable hog cabin which was banked on the sides with straw and manure. This lot received no more exercise than the lot inside, as they were fed quite close to the sleeping quarters. Individual weights were taken every month.

One pig in the warm building contracted rheumatism and died a short time before the experiment was concluded. This rendered it impossible to realize any profit from the inside lot. The table below shows only the three pigs for the inside lot, which came through the experiment without serious effects from rheumatism.

WINTER HOUSING OF SWINE

	Inside	Outside
Number of pigs in each group	3	4
First gross weight ... Lbs.	395	394
First average weight ... "	98·7	98·5
Final gross weight ... "	534	701
Final average weight ... "	178	175
Number of days in experiment	82	82
Total gain for period ... Lbs.	238	307
Average gain per animal ... "	79·3	76·7
Average daily gain per animal ... "	·96	·93
Quantity of meal eaten ... "	1,042	1,390
Total cost of feed ... $	12.95	17.26
Cost of feed per head ... $	4·31	4.31
Pounds of feed required per pound gain ... Lbs.	4·3	4·5
Feed cost to produce one pound gain	5·4	5·6

Prices charged for feeds:—

Oats	35c. per bushel
Barley	40c. "
Oil-cake	$2.70 per hundred

It will have been noted from the table the difference in gain and feed required per pound gain is very small between the two lots. However, the danger from rheumatism renders it unwise to winter pigs in a warm building. During the cold weather of a northwestern Saskatchewan winter, pigs in a tight building become moist from the vapour from their bodies and almost invariably contract rheumatism.

The feed used in this experiment consisted entirely of oats and oil cake meal until near the end of the period, when some barley was added and the quantity per day was increased to fit the pigs for the block. It should be added that spring was opening up at this time which eliminated the danger from fairly heavy feeding, so vigorously guarded against during the winter months.

PASTURE VS DRY LOT FOR GROWING SWINE

Object of Eperiment.—To find the value of rape pasture for growing swine.

How Experiment was Conducted.—Two lots of six pigs each were used. One lot was placed in a rape pasture which had attained a height of about ten inches and the other lot confined in a dry pen. Both lots had access to chop at all times in a self-feeder. The chop consisted of two-thirds oats and one-third rye by weight. The results are set forth in the following table:—

RAPE PASTURE VS. DRY LOT FOR GROWING SWINE

—		Dry lot	Pasture
Number in each lot		6	6
First weight (gross)	Lbs.	473	489
First average weight	"	78·8	81·5
Final weight (gross)	"	718	897
Final average weight	"	119·6	149·5
Number of days in experiment		66	66
Total gain for 66 days	Lbs.	245	408
Average gain each	"	40·8	68
Average daily gain	"	0·618	1·03
Pounds of feed consumed	"	2,190	2,245
Total cost of feed	$	26·65	27.32
Feed cost per pound gain	"	0·108	0·066
Pounds of meal required per 100 lbs. gain	Lbs.	893	550

Cost of feeds:—

Oats	40c. per bushel
Rye	75c. "

This experiment has been carried on for a number of years at this Station and the pasture has consistently increased the gains and decreased the cost per pound gain. The pasture seems to keep the pigs in a more thrifty condition and in this case the pasture lot has eaten more grain, although the reverse is usually true. However, the pasture has resulted in a saving of 343 pounds of grain per 100 pounds gain and a further saving of feed is effected by having the pasture lot ready for market sooner than those fed in a dry lot.

FIELD HUSBANDRY

ROTATION OF CROPS

Three of the rotations started in 1911 are being continued. One of these was modified in 1920 and sunflowers were substituted for field peas, while sweet clover instead of alfalfa was mixed with the grass. The newer crop rotations are all of short duration. A rotation with a cycle of from three to six years generally requires less fencing than one of longer duration, and, as a rule, in short rotations summer-fallows are more frequent and thus afford a better opportunity to control weeds and to store up moisture.

ROTATION "C" (Three Years' Duration).

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

Based on pre-war prices the average net profit for this rotation for a period of 11 years amounted to $3.81 per acre. The more thoughtful farmer will be likely to make some modifications in the above rotation.

ROTATION "J" (Six Years' Duration)

First year—Summer-fallow.
Second year—Wheat.
Third year—Oats.
Fourth year—Oats (seeded down 10 pounds Western rye, 3 pounds alfalfa).
Fifth year—Hay.
Sixth year—Pasture.

This rotation has, in most seasons, produced fair returns. A rotation which permitted seeding down with the first crop of grain after summer-fallow would undoubtedly give heavier yields of hay in the first cropping year. On the average grain farm on the prairies, the main objects in seeding down, in addition to supplying some hay and pasture, are to prevent soil drifting, to aid in controlling weeds and to have some crops other than cereal crops included in the rotation. Heavy yields from the hay crops, while acceptable, are not essential since there must necessarily be quite a large acreage down to grass if the objects previously mentioned are to be attained. In so far as securing a catch of grass with the third crop of grain after summer-fallowing is concerned, twenty-acre fields have been sown each year since 1915 on this rotation and a catch has been secured each year. The average profits from this rotation for an 11-year period amount to $4.41 per acre, based on pre-war prices.

ROTATION " P " (EIGHT YEARS' DURATION)

First year—Summer-fallow.
Second year—Wheat.
Third year—Wheat.
Fourth year—Summer-fallow, 15 tons per acre of rotted manure ploughed under.
Fifth year—Sunflowers.
Sixth year—Barley, seeded down 10 lbs. western rye, 6 lbs. sweet clover.
Seventh year—Hay.
Eighth year—Pasture.

This rotation as now arranged is designed primarily to determine the possibilities of growing sunflowers in a rotation and in addition to ascertain their effects on succeeding crops. Growing the sunflowers on summer-fallow has decreased the labour necessary to keep the field free from weeds but the crop of barley following the sunflowers has been unprofitable.

Sweet Clover Rotation (Three Years' Duration)

First year—Summer-fallow.

Second year—Wheat, half the field seeded to sweet clover.

Third year—Oats and half the field sweet clover.

This rotation provides for a frequent summer-fallow year and for a nitrogen-fixing crop for every sixth year. Both these are important factors in districts with low precipitation. Adopted on a half-section farm there would be one hundred acres of summer-fallow, an equal area in wheat, fifty acres of oats and fifty acres of sweet clover for hay and pasture. While comparatively little experimental work has been done to determine the possibilities of growing sweet clover with a nurse crop, the last two years' work at Scott would indicate that, even in a dry season, fair catches of sweet clover can be obtained and medium crops secured, providing rate of seeding of the nurse crop of grain does not exceed about one bushel per acre.

Fall Rye Rotation (Three Years' Duration)

First year—Summer-fallow.

Second year—Wheat.

Third year—Fall rye for half the field; the seed for the fall rye is to be mixed with the seed wheat and sown in the spring; for the other half the fall rye will be drilled in on the wheat stubble field in the autumn.

This rotation is planned to determine the best method of seeding to secure stands of fall rye that will withstand the severe winters. In addition, chemical tests will be made to determine the plant food used up by this and by the other rotations that are being tried out.

Alternate Crop and Summer-Fallow (Two Years' Duration)

First year—Summer-fallow.

Second year—Wheat.

This cropping arrangement has been started with a view to finding out the costs and return values as compared with the arrangement followed by a number of farmers: namely, two crops of grain in between each summer-fallow year. This arrangement started on new land permits keeping it comparatively clean, and, in addition, it should insure some crop practically every season. With all the summer-fallow land well worked during the previous season the crop can be sown early. This will permit an early start with the summer-fallowing, and both these factors will have a bearing on increasing crop yields. One objection is, of course, the rapidity with which the soil fibre will be destroyed. Two years' results, based on current prices, show the cost of production per acre for this rotation to have amounted to $9.51 per acre, while the cost for the three-year rotation amounted to $11.62 per acre. Due to two-thirds of the land producing crop the returns from the latter amounted to $17.37 per acre, while for the former, with only one-half the area producing, the returns were only $9.05 per acre.

Summary of Rotation Experiments

COMPARATIVE COSTS, RETURNS AND NET PROFITS OR LOSSES PER ACRE BASED ON CURRENT PRICES ON ROTATIONS THAT HAVE BEEN IN FULL OPERATION THREE YEARS OR LONGER

Rotation	Average Yield per Acre 3-Years		
	Average cost to operate per acre	Average returns per acre	Average net profit per acre
	$ cts.	$ cts.	$ cts.
"C" (three years' duration)	11 62	17 37	5 75
"J" (six years' duration)	11 14	14 51	3 37
"P" (eight years' duration)	15 01	16 98	1 98

The increased returns from Rotation "C" are largely due to the good prices obtained for wheat. On "J", one-third of the total area has been growing oats and, as prices for oats have been low, the profits are correspondingly decreased.

COST OF PRODUCTION OF FIELD CROPS, 1921-22

In computing the cost of production of field crops the following values have been used. These values are based on current prices paid during 1921 and 1922.

Cost Values

—		1921	1922
		$ cts.	$ cts.
Rent of land	per acre	3 20	3 20
Manure (charged equally over all years of rotation)	per ton	1 00	1 00
Seed wheat	per bush.	2 00	1 50
Seed oats	"	0 75	0 75
Seed barley	"	0 75	0 75
Seed rye	"	2 00	1 50
Seed sunflowers	per lb.	0 10	0 10
Seed western rye grass	"	0·12	0 09
Seed sweet clover	"	0 10	0 25
Seed alfalfa	"	0 58	0 52
Twine	per acre	0 40	0 14
Machinery	"	0 90	0 90
Manual labour	per hour	0 35	0 30
Single horse	"	0 10	0 10
Man and horse	"	0 45	0 40
Tractor work charged for oil, engineer, etc.			
Threshing—			
Wheat	per bush.	0 10	0 10
Oats	"	0 05	0 05
Barley	"	0 06	0 06
Rye	"	0 06	0 06

RETURN VALUES

——		1921	1932
		$ cts.	$ cts.
Wheat (prices as at Oct. 1, 1921-22 for grain of same grade)	per bush.	1 05	0 82
Oats	"	0 31	0 34
Barley	"	0 40	0 40
Western rye hay	per ton	10 00	10 00
Wheat straw	"	1 00	1 00
Oat straw	"	2 00	2 00
Barley straw	"	2 00	2 00
Rye straw	"	.....	1 00
Pasture for cow or horse	per month	1 40	1 80
Pasture for sheep	"	0 35	0 45
Sunflowers and other silage crops	per ton	3 00	5 00

ROTATION "C," 1921

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: 2 Horse Team	3 Horse Team	4 Horse Team	5 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	Hosd 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	Wheat	Summer-fallow	1·5	4 80	1 35	.....	.....	1·5	.....	5·75	.....	4 31	.....	10 46	6 97	.....	.....	.....	.....	.....	.....	.....	.....	.....	−6 97
2	Summer-fallow	Wheat	1·5	4 80	6 45	1·5	·52	1·81	.....	2·0	.....	2 49	3 90	18 16	12 11	0 46	.....	6	2,340	2,750	.....	.....	42 32	28 22	16 11
3	Wheat	Wheat	1·5	4 80	6 45	1·5	0 52	8·5	.....	8·5	.....	11 04	4 00	26 81	17 87	0 67	.....	6	2,400	2,460	.....	.....	43 23	28 82	10 95
Aggregate			4·5	14 40	14 25	3·00	1 04	11·81	.....	16·25	.....	17 84	7 90	55 43	.....	.....	.....	.....	.....	.....	.....	.....	85 55	.....	.....
Average per acre 1921			...	3 20	3 16	0·66	0 23	2·6	.....	3·6	.....	3 97	1 75	.....	12 31	.....	.....	.....	.....	.....	.....	.....	.....	19 00	6 69
Average per acre for 2 years			....	3 20	3 44	·60	0 22	1·59	.....	3·86	.....	3 87	1 76	.....	12 50	.....	.....	.....	.....	.....	.....	.....	.....	23 41	10 91

ROTATION "C," 1922

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: 2 Horse Team	3 Horse Team	4 Horse Team	5 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	Pasture	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.		$ c.	$ c.	$ c.
1	Wheat	Summer-fallow	1·5	4 80	0 90	.....	.....	·5	.....	10·25	.....	7 43	.....	13 13	8 74	.....	.....	.....	.....	.....	.....	.....	.....	.....	−8 74
2	Summer-fallow	Wheat	1·5	4 80	4 93	1	0 30	1·5	.....	2·25	.....	2 33	1 30	13 66	9 10	1 05	.....	4	780	850	.....	.....	11 08	7 38	−1 72
3	Wheat	Wheat	1·5	4 80	4 93	1	0 30	.....	.....	8·75	.....	6 11	1 50	17 64	11 76	1 17	.....	4	900	1,030	.....	.....	12 81	8 54	−3 22
Aggregate			4·5	14 40	10 76	2	0 60	2	.....	21·25	.....	15 87	2 80	44 43	29 60	.....	.....	.....	.....	.....	.....	.....	23 89	15 92	−13 68
Average per acre 1922			....	3 20	2 39	·4	0 13	·4	.....	4·72	.....	3 52	0 62	.....	9 87	.....	.....	.....	.....	.....	.....	.....	.....	530	−4 57
Average per acre for 3 years			....	3 20	3 09	·62	0 19	1·08	.....	4·13	.....	3 75	1 38	.....	11 62	.....	.....	.....	.....	.....	.....	.....	.....	17 37	5 75

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: 2 Horse Team	3 Horse Team	4 Horse Team	5 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	Pasture	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.	$	$ c.	$ c.	$ c.
1	Pasture	Summer-fallow	20	64 00	18 00	.....	.....	.....	.....	142·0	.....	106 50	.....	188 50	9 42	.....	.....	.....	.....	.....	.....	51·10	51 10	2 55	−6 87
2	Summer-fallow	Wheat	20	64 00	86 00	21·5	7 52	.....	.....	50·0	.....	37 50	49 10	244 12	12 22	·49·7	.....	6	29,460	20,280	.....	.....	525 69	26 28	14 06
3	Wheat	Oats	20	64 00	56 00	23·0	8 05	.....	3·5	157·0	.....	120 02	51 50	299 57	14 98	·29	.....	6	35,020	28,980	.....	7·00	355 28	17 76	2 78
4	Oats	Oats seeded	20	64 00	56 00	18·5	6 87	.....	.....	89·0	.....	66 75	53 40	247 02	12 35	·23	.....	6	36,312	25,688	.....	7·00	363 76	18 18	5 83
5	Oats seeded	Pasture	20	64 00	29 40	.....	.....	.....	.....	.....	.....	.....	.....	93 40	4 67	.....	.....	.....	.....	.....	.....	42·70	42 70	2 13	−2 54
6	Hay	Hay	20	64 00	47 40	174·00	60 90	123·5	.....	.....	.....	67 92	.....	240 22	12 01	.....	6 33	.....	.....	.....	75,815	28·00	407 07	20 35	8 34
Aggregate			120	384 00	292 80	237·0	83 34	123·5	3·5	438·00	.....	398 69	154 00	1312 83	.....	.....	.....	.....	.....	.....	.....	.....	1,745 60	.....	.....
Average per acre 1921			....	3 20	2 44	1·97	·69	1·02	·02	3·65	.....	3 33	1 28	.....	10 94	.....	.....	.....	.....	.....	.....	.....	.....	14 55	3 61
Average per acre for 2 years			..	3 20	3 17	1·68	0·64	3·86	·04	3·22	5·2	3 11	1 55	.....	11 96	.....	.....	.....	.....	.....	.....	.....	.....	18 16	6 20

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: Engine	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	Pasture	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.	$	$ c.	$ c.	$ c.
1	Hay	Summer-fallow	20	64 00	18 00	.....	.....	70 04	43·75	.....	.....	21 87	.....	173 91	8 69	.....	.....	.....	.....	.....	.....	36 00	36 00	1 80	−6 89
2	Summer-fallow	Wheat	20	64 00	65 80	14	4 20	.....	.....	.....	46·5	32 55	32 50	199 05	9 95	0 52	.....	4·5	19,500	19,200	.....	.....	276 10	13 80	3 85
3	Wheat	Oats	20	64 00	50 80	11	3 30	.....	.....	.....	124·75	87 31	24 10	229 51	11 47	0 47	.....	4	16,388	12,000	.....	.....	175 88	8 79	−2 68
4	Oats	Oats seeded down	20	64 00	50 80	11	3 30	73 40	44	.....	.....	22 00	21 60	235 10	11 75	0 54	.....	4	14,688	12,000	.....	.....	158 88	7 94	−3 81
5	Oats seeded down)	Hay	20	64 00	28 80	32·5	9 75	.....	92·5	.....	.....	46 25	.....	148 80	7 44	.....	.....	.....	.....	.....	11,320	28 80	85 40	4 27	−3 17
6	Pasture	Hay	20	64 00	28 80	50	15 00	.....	94	.....	.....	47 00	.....	154 80	7 74	.....	.....	.....	.....	.....	19,605	36 00	134 02	6 70	−1 04
Aggregate			160	384 00	243 00	118·5	35 55	143 44	274·25	.....	171·25	256 98	78 20	1.141 17	57 04	.....	.....	.....	.....	.....	.....	.....	866 28	43 30	−13 74
Average per acre 1922			....	3 20	2 02	9	0 29	1 19	2·28	.....	1·41	2 14	0 65	.....	9 50	.....	.....	.....	.....	.....	.....	.....	.....	6 91	−2 29
Average per acre for 3 years			....	3 20	2 62	1·15	0 52	0 74	3·33	.....	2·62	2 78	1 25	.....	11 14	.....	.....	.....	.....	.....	.....	.....	.....	14 51	3 37

ROTATION "P," 1921

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	Cost of ensiling	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	Hood 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.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
1	Pasture	Sum'r-fallow..	1·5	8 01	1 35	....	....	....	1	.....	10·25	.....	8 23	.....	17 59	11 72	.....	.....	.....	.....	.....	.....	.....	.....	.....	−11 72
2	Summer-fallow	Wheat.....	1·5	8 01	6 45	1	0 35	....	1	.....	3·5	.....	3 17	4 20	22 18	14 79	·52·8	.....	6	2,520	2,760	.....	.....	45 48	30 32	15 53
3	Wheat	Wheat.....	1·5	8 01	6 45	1·5	0 52	....	2·5	.....	8	.....	7 37	3 40	25 75	17 16	·75·7	.....	6	2,040	2,200	.....	.....	36 80	24 53	7 37
4	Wheat.....	Sum'r-fallow..	1·5	4 80	1 35	....	....	....	1·5	.....	9·5	.....	7 94	.....	14 09	9 39	.....	.....	....	.....	.....	.....	.....	.....	.....	−9 39
5	Summer-fallow	Sunflowers....	1·5	8 01	3 45	6	2 10	....	18	.....	1	7 08	10 65	.....	31 29	20 86	.....	3 45	5	.....	.....	.....	18,090	27 13	18 09	−2 77
6	Sunflowers	Barley seeded	1·5	8 01	4 20	1·5	0 52	....	2·14	1·75	·5	.....	2 69	1 08	16 50	11 00	0 91	.....	...	864	2,006	.....	.....	9 20	6 13	−4 87
7	Barley	Hay.....	1·5	8 01	2 70	2	70	....	6·75	.....	.....	.....	3 71	....	15 12	10 08	.....	9 24	3	.....	.....	3,270	.....	16 35	10 90	0·82
8	Hay...	Pasture Hay..	1·5	8 01	2 70	5·5	1 92	....	10·5	.....	.....	.....	5 77	.....	18 40	12 26	.....	16 72	3	.....	.....	2,200	.....	11 00	7 33	−4 93
Aggregate.....			12·0	60 87	28 65	17·5	6 11	....	43·39	1·75	32·75	7 08	49 53	8 68	160 92	.....	.....	.....	....	.....	.....	.....	.....	145 96	.....	.....
Average per acre 1921.....			....	5 07	2 38	1·4	0 51	....	3·61	·14	2·89	0 59	4 14	0 72	....	13 41	.....	.....	....	.....	.....	.....	.....	.....	12 16	−1 25
Average per acre for 2 years.....			....	4 89	2 94	2·5	0 78	·37	3·2	·23	2 82	1 97	4 61	0 92	.....	16 11	.....	.....	....	.....	.....	.....	.....	.....	19 47	3 36

ROTATION "P," 1922

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: Engine	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	Pasture	Summer fallow	1·5	8 01	1 35				2·5		13·5	10 70		20 06	13 37										−13 37
2	Summer-fallow	Wheat	1·5	8 01	4 93	1·5	0 45		5·5			2 75	3 50	19 64	13 09	0 56		6	2,100	1,160			29 28	19 48	6 39
3	Wheat	Wheat	1·5	8 01	4 93	1·5	0 45		5·25		5	6 12	2 20	21 71	14 47	0 98		6	1,320	1,490			18 78	12 52	−1 95
4	Wheat	Summer fallow	1·5	8 01	1 35						10·25	7 17		16 53	11 02										−11 02
5	Summer-fallow	Sunflowers	1·5	8 01	4 86	2·5	0 75	2 91	17·25		1	9 32		25 85	17 23		1 97					26,180	65 45	43 63	26 40
6	Sunflowers	Barley (seeded)	1·5	8 01	3 81	4·5	1 35	1 26	3·5		3	3 85		18 28	12 18		7 25				5,040		12 60	8 40	−3 78
7	Barley	Hay	1·5	8 01	3 36	3	0 90				7·25	3 86		16 13	10 72		14 02				2,300		11 50	7 66	−3 06
8	Hay	Hay	1·5	8 01	3 36	2	0 60				7·5	3 75		15 72	10 48		22 45				1,400		7 00	4 66	−5 82
Aggregate			12	64 08	27 95	15	4 50	4 17	49·5		32·75	47 52	5 70	153 92	102 56								144 61	96 35	−6 21
Average per acre 1922				5 34	2 33	1·2	0 37	0 35	4·1		2·72	3 96	0 47		12 82									12 04	−0 77
Average per acre for 3 years				5 04	2 73	2·1	·64	0 12	3·5	1·31	2·78	4 39	0 77		15 01									16 98	1 98

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	Oats	Summer-fallow	2½	7 46	2 10						14½	9 91		19 47	8 34										−8 34
2	Summer-fallow	Wheat	2½	7 46	7 68	2	0 60		2·5		2·75	3 16	2 20	21 10	9 03	0 95			1,320	1,875			18 93	8 11	−0 92
3	Wheat	Oats	2½	7 46	2 96	1	0 30		1·5			4 36	1 30	12 65	10 84	0 48			884	731			9 72	8 34	−2 50
	Wheat	Sweet Clover			4 55	3	0 90		9		5½	4 50		13 68	11 72						2,500		12 50	10 71	−1 01
Aggregate			7	22 38	17 29	6	1 80		13·0		22·5	21 93	3 50	66 90	39 93								41 15	27 16	−12 77
Average per acre 1922				3 17	2 47	·8	0 25		·18		2·5	3 14	5 0	9 55	9 98									6 79	−3 19
Average per acre for 2 years				3 18	2 56	·8	0 27		·53		3·69	2 93	0 25		10 89									11 84	1 49

Rotation—Fall Rye, 1922

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	Hay	Summer fallow	2½	7 46	2 60	.....	.....	.....	.....	.....	14	9 80	.....	19 36	8 28	.....	.....	.....	.....	.....	.....	.....	.....	.....	−8 28
2	Summer-fallow	Hay	2½	7 46	7 63	4	1 20	.....	9·75	.....	3	4 87	2 50	6 07	2 58	0 86	.....	4	E600	800	3,280	.....	16 40	7 02	4 41
		Wheat				2	0 60	.....	2·75	.....		3 46		21 70	9 30				W900	1,050			21 42	9 18	−0 12
3	Hay, Summer fallow	Fall and Spring Rye	2½	7 46	11 18	2	0 60	.....	11·01	.....	11·75	13 76	2 46	35 46	15 19	0 86	S Rye	4	1,736	1,749	.....	.....	22 65	9 69	−5 50
																	F Rye	.....	560	910	.....	.....	.....	.....	.....
Aggregate			7	22 38	20 96	8	2 40	.....	23·51	.....	28·75	31 89	4 96	82 59	35 35	.....	.....	.....	.....	.....	.....	.....	60 47	25 89	−9 46
Average per acre 1922			....	3 19	2 99	1·1	0 34	.....	3·35	.....	4·10	4 55	0 70	11 79	11 78	.....	.....	.....	.....	.....	.....	.....	.....	8 63	−3 15
Average per acre for 2 years			....	3 19	3 30	2·5	0 85	.....	4·42	.....	5·03	5 03	0 35	.....	12 72	.....	.....	.....	.....	.....	.....	.....	.....	9 58	−3 16

ROTATION—ALTERNATE CROP AND SUMMER-FALLOW, 1922

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: 2 Horse Team	3 Horse Team	4 Horse Team	5 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	Wheat	Summer-fallow	2⅓	9 80	2 10	.....	.....	.....	.....	.....	15·5	6 20	.....	18 10	7 75	.....	.....	.....	.....	.....	.....	.....	.....	.....	−7 75
2	Summer-fallow	Wheat	2⅓	9 80	7 68	2	0 60	.....	2	.....	2·75	1 10	2 90	22 08	9 46	0 76	.....	.....	1,740	2,220	.....	.....	24 89	10 65	1 19
Aggregate			4⅔	19 60	9 78	2	0 60	.....	2	.....	18·25	7 30	2 90	40 18	.....	.....	.....	.....	.....	.....	.....	.....	24 89	10 65	−6 56
Average per acre 1922			....	4 20	2 09	·4	0 12	.....	·4	.....	3·91	1 56	0 62	.....	8 60	.....	.....	.....	.....	.....	.....	.....	.....	5 32	−3 28
Average per acre for 2 years			....	3 69	2 34	·28	0 15	.....	·18	·24	3·80	2 43	0 90	.....	9 51	.....	.....	.....	.....	.....	.....	.....	.....	9 05	−0 47

COST OF PRODUCING OATS AFTER WHEAT

Area of field.—Twenty acres.

Preceding Crops.—Wheat, summer-fallow, pasture, hay, oats seeded down.

Items of Cost.—

Rent of 20 acres at $3.20 per acre	$64 00
Use of machinery at 90c per acre	18 00
Cost of seed 40 bushels of oats at 75c	30 00
Cost of fall ploughing—1 man and 4 horses 81 hrs. at 75c	60 75
Harrowing—man and 4 horses 8½ hrs. at 75c	6 37
Packing—man and 4 horses 18 hrs. at 75c	13 50
Cultivating—man and 4 horses 10½ hrs. at 75c	7 87
Seeding—man and 4 horses 12 hrs. at 75c	9 00
Cutting—man and 4 horses 27 hrs. at 75c	20 25
Cutting—man and 3 horses 3½ hrs. at 65c	2 27
Manual labour stooking 23 hrs. at 35c	8 05
Binder twine at 40c per acre	8 00
Threshing at 5c per bushel	51 50
Total cost for 20 acres 1921	299 56
Total cost for 20 acres 1922	229 51

	1921	1922
Total yield from 20 acres	1,030 bushels	482 bushels
Total yield from 1 acre	51·5 "	24 "
Cost for 1 acre	$ 14 97	$ 11 47
Cost for 1 bushel	$ 0 29	$ 0 47

COST OF PRODUCING WESTERN RYE GRASS HAY

Area of field.—Twenty acres.

Preceding crops.—Hay, oats seeded down, oats, wheat, summer-fallow.

Items of cost—

Rent of 20 acres at $3.20 per acre	$ 64 00
Use of machinery at 90c per acre	18 00
Cost of half of seed, balance chargeable to pasture—	
200 lbs. of western rye grass at 12c and 60 lbs. of alfalfa at 58c	29 40
Mowing—1 man and 2 horses 27½ hrs. at 55c	15 12
Raking—1 man and 2 horses 25 hrs. at 55c	13 75
Hauling—1 man and 2 horses 71 hrs. at 55c	39 05
Hauling—1 man 174 hrs. at 35c	60 90
Total cost for 20 acres 1921	$ 240 22
Total cost for 20 acres 1922	148 80

	1921	1922
Total yield for 20 acres	37 tons 1,815 lbs.	5 tons 1,320 lbs.
Total yield for 1 acre	1 ton 1,790 "	566 "
Cost for 1 acre	$ 12 01	$ 7 44
Cost for 1 ton in barn	6 33	26 39

COST OF PRODUCING WHEAT ON WESTERN RYE GRASS SUMMER-FALLOW

Area of field.—Twenty acres.

Preceding crops.—Summer-fallow, pasture, hay, oats seeded down, oats.

Items of cost—

Rent of 20 acres at 13.20 per acre	$64 00
Use of machinery at 90c per acre	18 00
Seed wheat 30 bushels at $2.00 per bushel	60 00
Cultivating before seeding—1 man and 4 horses 19½ hrs. at 75c	14 62
Seeding—1 man and 4 horses 12½ hrs. at 75c	9 37
Cutting—1 man and 4 horses 18 hrs. at 75c	13 50
Stooking—1 man 21½ hrs. at 35c	7 52
Twine at 40c per acre	8 00
Threshing at 10c per bushel (actual cost)	49 10
Total cost for 20 acres 1921	$244 11
Total cost for 20 acres 1922	199 05

	1921	1922
Total yield for 20 acres	491 bushels	325 bushels
Total yield for 1 acre	24·5 "	16·2 "
Cost per acre	$12 20	$9 95
Cost for 1 bushel	49·7c	$0 61

NOTE.—If the total cost of summer-fallow were added to this, the cost per bushel would be increased. The 1921 figures show cost of summer-fallowing

adjoining field to amount to $9.42 per acre. This amount added to the $12.20 per acre would make the cost amount to 88 cents per bushel. The 1922 results show that the cost of summer-fallow added to the cost per acre during the current year would bring the cost to $1.15 per bushel.

COST OF PRODUCING SUNFLOWERS ON SUMMER-FALLOW

Area of field.—One and one-half acres.

Preceding crops.—Summer-fallow, wheat, wheat, summer-fallow, pasture, hay, barley seeded down.

Items of cost—

Rent of 1½ acres of land at $3.20 per acre	$4 80
Use of machinery at 90c per acre	1 35
Seed 15 lbs. sunflowers at 10c per lb	1 50
Manure ⅓ share of 22½ tons at $1.00 per ton	2 75
Harrowing and cultivating before seeding—1 man and 4 horses at 75c per hour	0 75
Planting —1 man and 2 horses 2½ hrs. at 55c	1 37
Packing after seeding—1 man and 2 horses 1 hr. at 55c	0 55
Cultivating, June and July—1 man and 2 horses 11½ hrs. at 55c	6 32
Cultivating, August—1 man and 1 horse 4 hrs. at 45c	1 80
Hoeing—1 man 6 hrs. at 35c	2 10
Harvesting—1 man and 2 horses 3 hrs. at 55c	1 65
Cost of twine at 40c an acre	0 60
Cost of ensiling	7 08
Total cost for 1½ acres 1921	$32 62
Total cost for 1½ acres 1922	25 85

	1921	1922
Total yield for 1½ acres	18,090 lbs.	26,180 lbs.
Yield per acre	12,060 "	17,453 "
Cost per acre	$21 74	$17 23
Cost per ton	3 60	1 97

NOTE.—If the cost of summer-fallow is added to the cost of production of the sunflowers, the two years' results show the cost per acre to amount to $29.38 or a cost per ton of $4.98. In view of this cost it has been considered advisable to test the sunflowers as a cleaning crop and this is under way on this Station at the present time.

COST OF PRODUCING BARLEY AFTER SUNFLOWERS

Area of field.—One and one-half acres.

Preceding crops.—Sunflowers, summer-fallow, wheat, wheat, summer-fallow, pasture, hay.

Items of cost—

Rent of 1½ acres of land at $3.20 per acre	$4 80
Use of machinery at 90c per acre	1 35
Seed 3 bushels at 75c per bushel	2 25
Manure ⅓ share of 22½ tons at $1.00 per ton	2 81
Sowing—1 man and 2 horses 1½ hrs. at 55c	0 82
Packing—1 man and 2 horses ¾ hr. at 55c	0 36
Harrowing—1 man and 4 horses ½ hour at 75c	0 37
Cutting—1 man and 3 horses 1¾ hrs. at 65c	1 13
Stooking—1 man 1½ hrs. at 35c	0 52
Twine—40c per acre	0 60
Threshing—at 6c per bushel	1 08
Total cost for 1½ acres	16 09
Total yield for 1½ acres	18 bush.
Yield per acre	12 "
Cost per acre	$10 73
Cost per bush	0 89

NOTE.—The summer of 1922 was very dry, consequently the barley following the sunflowers made but a weak growth. In the late summer rains came and a second growth came up in the crop. This was left until September 20 but as the heads were not filling the crop was cut and put into the silo.

CULTURAL EXPERIMENTS

DEPTH OF PLOUGHING

The time of ploughing the summer-fallow in this experiment is early June. The depths are indicated in the table below. The subsoiling was done in former years by an attachment on the plough and, more recently, by following in the furrow with another plough from which the mouldboard had been removed. The object is to stir the soil four inches below the regular furrow.

Depth of ploughing summer fallow Influence on first crop	Yield per acre			
	Wheat 1922		Wheat Eight-year Average	
	Bush.	Lbs.	Bush.	Lbs.
Ploughed 3 inches deep	14	.....	21	10
" 4 " "	14	40	22	16
" 5 " "	15	28	21	19
" 6 " "	13	48	21	5
" 7 " "	13	8	21	26
" 8 " "	15	.....	20	41
" 5 " " and subsoiled 4 inches	20	48	22	34
" 6 " " " 4 "	23	8	22	14
" 7 " " " 4 "	19	36	22	23
" 8 " " " 4 "	16	8	21	24

For a number of years there seemed to be nothing gained by subsoiling, but the 1922 yields have brought the average above the yields resulting from the ploughing at corresponding depths but not subsoiling. Some of the 1922 yields would justify the extra labour required for subsoiling but the eight-year average would still indicate that subsoiling or ploughing summer-fallow deeper than four inches is unprofitable.

With a view to determining the influence upon the second crop, the wheat stubble is all ploughed in the fall five inches deep, except plots one and two which are ploughed the same depth as in the summer-fallow year, (3 and 4 inches respectively) as shown in table.

The following table gives the comparative yields of oats obtained in the second year after summer-fallow:—

DEPTH OF PLOUGHING TEST
Rotation—Summer-fallow—Wheat—Oats

Depth of ploughing summer-fallow Influence on second crop		Yield per acre			
Summer-fallow ploughed	Wheat stubble ploughed	Oats 1922		Oats Seven-year average	
		Bush.	Lbs.	Bush.	Lbs.
3 inches	3 inches	25	6	47	2
4 "	4 "	34	12	49	13
5 "	5 "	31	6	46	14
6 "	5 "	29	2	44	25
7 "	5 "	27	10	44	.....
8 "	5 "	30	28	43	26
5 " subsoil 4 inches	5 "	29	30	46	24
6 " " 4 "		31	6	47	16
7 " " 4 "		31	14	47	26

The four-inch ploughing has given the highest yield. This plot has been ploughed the same depth since 1915, both as summer-fallow and fall ploughing, and if there is any hardening at the sole of the furrow, it has not decreased

the yield. However, the soil at this Station is a chocolate clay loam of a medium texture. A heavier soil may give trouble by hardening at the sole of the furrow when ploughed at the same depth year after year.

SUMMER-FALLOW TREATMENT

In the summer-fallow treatment experiment, another comparison in depth of ploughing is made which serves as a partial duplicate to the previous experiment (depth of ploughing summer-fallow).

SUMMER-FALLOW TREATMENT

Depth of ploughing	Yield per Acre					
	Wheat				Oats	
	First crop on summer-fallow. 1922		First crop on summer-fallow. Eight-year average		Second crop after summer-fallow. Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Plough 4 inches in June	14	–	21	48	55	22
" 6 "	13	20	21	48	53	1
" 8 "	15	28	21	42	54	28

The general results from the previous experiments are borne out here, showing again that the average yield is not increased to any marked extent by the deep ploughing of summer-fallow.

PLOUGHING SUMMER-FALLOW ONCE VS. TWICE

Treatment of summer-fallow	Yield per acre					
	Wheat				Oats	
	First crop on summer-fallow. 1922		First crop on summer-fallow. Eight-year average		Second crop after summer-fallow. Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Plough 4 inches in June	14	–	21	48	55	22
" 6 "	13	20	21	48	53	–
" 4 " and 4 inches in September	16	20	22	25	53	11
" 6 " 6 " "	15	48	22	9	51	24
" 8 " 8 " "	15	–	21	22	48	4
" 6 " 4 " "	15	20	23	13	48	27
" 4 " 6 " "	16	–	26	9	48	26

The above table shows an increased average yield in the first crop resulting from the ploughing of the summer-fallow four inches in June and six inches in September as compared with once ploughing in June four inches deep. The highest yield in the second crop is from the plot which was ploughed only once, four inches deep, as summer-fallow.

PASTURED VS CULTIVATED SUMMER-FALLOW

The pasture plot is ploughed in June and seeded to oats at the rate of one-half bushel per acre. As soon as the crop is about six inches high, sheep are used to consume the pasture.

PASTURE VS. CULTIVATED SUMMER-FALLOW

Treatment of summer-fallow	Yield per acre					
	Wheat				Oats	
	First crop after treatment. 1922		First crop after treatment. Eight-year average		Second crop after treatment. Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Ploughed in June—cultivated	15	48	23	35	45	5
" " —seeded to oats and pastured	14	8	19	52	48	26

The pasturing results in a decreased yield in the first crop but this has been noticed to ripen earlier than does the crop on cultivated summer-fallow. In the second year after treatment the oat crop is heavier on the pasture lot. This is probably due to the excessive packing from pasturing being overcome and the fertilizing constituents in the manure becoming available.

TIME OF PLOUGHING SUMMER-FALLOW

—	Yield per acre					
	Wheat				Oats	
	First crop after treatment. 1922		First crop after treatment. Eight-year average.		Second crop after treatment. Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Ploughed 6 inches May 15	20	–	25	59	50	28
" 6 " June 15	15	48	23	35	45	5
" 6 " July 15	12	8	21	39	45	28

The importance of ploughing the summer-fallow early is very evident. The eight-year average shows a difference of 4 bushels and 20 pounds in favour of the May ploughing as compared with the July ploughing. In the oats as second crop, the difference is five bushels per acre and the 1922 wheat yield shows a difference of seven bushels and 52 pounds.

FALL CULTIVATION BEFORE SUMMER-FALLOWING

—	Yield per acre					
	Wheat				Oats	
	First crop after treatment. 1922		First crop after treatment. Eight-year average		Second crop after treatment. Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Cultivate stubble in autumn	11	40	22	40	47	–
Fall plough 4 inches deep	10	20	22	56	47	16
No fall cultivation	14	20	24	19	48	3

It appears that in these dry districts any operation which destroys the stubble in the fall will reduce the yield. The stubble will often hold five inches of snow which is equal to one half-inch of water. This is an important consideration, since the average annual precipitation for Scott for ten years is only 13·1 inches.

Spring cultivation of summer-fallow is generally thought to be a sound practice. No figures are available at this Station at present but an experiment is underway for the purpose of determining the value of the operation.

STUBBLE TREATMENT

This experiment has been conducted with first year wheat stubble. Weeds or grass have not been disturbing factors, as is often the case on the average farm. The stubble land has always been in a mellow condition as a result of a very thorough summer-fallow the year before. For these reasons the farmer should keep in mind that the results shown below may not be easily effected unless his stubble field is in good condition. Although this experiment indicates that under certain conditions "stubbling in" is more profitable than ploughing, the fact still remains that indiscriminate stubbling in of crops has been one of the chief causes of the rapid increase of weeds in the Prairie Provinces.

BURNING OF STUBBLE

	Yield per acre			
	Wheat			
	1922		Seven-year average	
	Bush.	Lbs.	Bush.	Lbs
Burn stubble in spring, seed at once	15	40	24	49
Spring ploughed stubble (average of two plots)	12	14	22	17
Burn stubble then plough in autumn	9	48	20	12
Burn stubble then disc in autumn	10	40	20	5

In burning the stubble in this experiment, sufficient straw was used to insure a perfect burn. The value of the stubble when left standing to catch the snow is again shown here. The average yield for seven years shows a difference of two bushels and thirty-two pounds in favour of burning the stubble in the spring and seeding at once as compared with spring ploughed stubble. The burning in the fall has not given as high a yield as spring ploughing. The yields indicate that, if a perfect burn could be affected in the spring on clean land, ploughing would not be necessary. However, with the light stubble of the dry districts, the cost of a clean burn may render the operation unprofitable. Another point which should be carefully considered is the value of the stubble when ploughed under in adding humus to the soil. This would not be so important if a rotation was being followed which included a perennial grass, but for the common grain and summer-fallow rotation the humus may become deficient more quickly when burning the stubble frequently.

DISCING STUBBLE

	Yield per acre			
	Wheat			
	1922		Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.
Disc at cutting time, spring plough	11	–	19	52
" " " autumn plough	7	20	17	51
Disc in autumn, seed in spring	13	28	19	52
Spring ploughed stubble (average two plots)	12	14	22	17

The average yields above indicate that spring ploughing of stubble is more profitable than disking at harvest time previous to spring ploughing or fall ploughing. Discing in the fall and seeding in the spring without ploughing has not proved as profitable as spring ploughing.

FALL VS. SPRING PLOUGHING

—	Yield per acre			
	Wheat			
	1922		Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.
Plough in spring (average of two plots)	12	14	22	17
" fall (average of two plots)	8	34	17	35

Spring ploughing consistently gives greater yields than fall ploughing. This difference is thought to be very largely due to the check of winter evaporation and the extra moisture resulting from the snow held in the stubble.

SPRING VS. FALL PLOUGHING FOR OATS

—	Yield per acre			
	Oats			
	1922		Eight-year average	
	Bush.	Lbs.	Bush.	Lbs.
Plough in autumn	23	6	40	13
" spring	29	30	49	3

SEEDING TO GRASS AND CLOVER

The object of this experiment is to determine the influence of the different preparatory crops and cropping systems previous to seeding down and the influence of seeding down with a nurse crop or seeding alone. No difficulty whatever has been experienced in getting catches of grass and clover whether alone or with a nurse crop or after first, second or third crop, although in dry seasons the hay crop has been light. The grass and clover seed is mixed with the nurse crop seed in the common drill box or, if being seeded alone, some cracked grain is mixed with the grass seed to increase the bulk sufficiently to make possible the regulation of the flow of grass seed.

FIRST HAY CROP—NINE-YEAR AVERAGE

—	Yield per acre			
	Sown alone		Sown with nurse crop	
	Tons	Lbs.	Tons	Lbs.
Sown on summer-fallow	2	88	1	755
" after turnips	1	1,288	1	120
" " first crop on summer-fallow	1	1,173	0	1,871
" " second " "	1	1,197	1	191

FIRST HAY CROP, 1922

	Yield per acre			
	Sown alone		Sown with nurse crop	
	Tons	Lbs.	Tons	Lbs.
Sown on summer-fallow	2	1,120	1	1,960
" after turnips	1	1,920	1	1,240
" " first crop summer-fallow	2	1,200	1	1,000
" " second " "	2	520	1	1,760

Seeding alone has invariably given a higher yield in the first year than seeding with a nurse crop but the yields of the second year have been approximately the same regardless of the method of seeding down or the crops grown previous to seeding down.

BREAKING SOD

Western Rye and Alfalfa

The western farmer knows the importance of breaking prairie sod early in the summer. This experiment has shown that it is just as necessary to break western rye grass and alfalfa sod early to insure a profitable crop of wheat to follow. The proportion of alfalfa seed used has been very small, hence this experiment deals with the breaking of western rye sod rather than alfalfa. It is not generally considered a sound practice to leave the sod unbroken more than three years in the dry areas of the west, as the hay crop usually becomes lighter after the second year. In the rotations on this Station the grass is usually broken after the second year.

The table below shows the comparative yields of wheat resulting from breaking at different times during the summer, backsetting and seeding on spring breaking.

FIRST CROP AFTER BREAKING

	Yield per acre			
	Wheat			
	1922		Six-year average	
	Bush.	Lbs.	Bush.	Lbs.
Break May 15 work as summer-fallow	12	48	13	12
" 3 inches early July backset Sept.	7	8	11	8
" 5 " late July keep cultivated	7	8	9	42
" in spring 5 inches deep work down and seed	6	40	9	9
" in October 5 inches deep work down	7	48	8	27

The plot broken early and summer-fallowed during the season previous to seeding to wheat has consistently given higher yields than breaking later in the summer or in the spring immediately before seeding. Alfalfa is not very successful as a hay crop in the climate of northwestern Saskatchewan, but the scattered plants have been found to be quite persistent and hard to eradicate completely. However, in this experiment the alfalfa has been seeded very thinly as compared with the western rye and for this reason has not given serious trouble as would have been the case if seeded heavily. The alfalfa will be omitted from this experiment in the future. It is recognized that western rye

and brome are two grasses for use in the dry portions of the West, hence a comment should be made here regarding the breaking of brome grass sod. Brome grass has not been included in this experiment but it has been found necessary on this station to plough brome grass sod twice during the summer to eradicate it. In the test of varieties of grasses western rye and brome are grown on adjoining plots under identical conditions and the difference in persistency is very noticeable.

APPLYING BARNYARD MANURE

The object of this experiment is to ascertain the value of barnyard manure when applied to fall ploughing, spring ploughing, stubble and summer-fallow. A comparison is made between rotted and fresh manure on wheat, oats and barley. The rate of application is twelve tons per acre in every case.

MANURE TO AFFECT WHEAT

Application to affect second crop after summer-fallow. Rotation: Summer-fallow; wheat; wheat	Yield per acre			
	Wheat			
	1922		Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.
Rotted manure in spring before ploughing	17	30	25	59
" fall before ploughing	13	20	23	17
No manure, burn stubble, fall plough	11	40	20	49
No manure, disc stubble, fall plough	11	–	20	57
Rotted manure after seeding on fall ploughed land	10	–	19	36
Fresh manure in winter on fall ploughed land	9	20	19	2
No manure—fall ploughed	10	40	18	19

FIRST CROP OF GRAIN AFTER SUMMER-FALLOW

	1922		Eight-year average	
	Bush.	Lbs.	Bush.	Lbs.
Fresh manure in winter on summer-fallow	16	40	21	41
Rotted manure after seeding on summer-fallow	16	20	22	35

The lowest average yield is from the unmanured plot. The plot ploughed in the spring immediately after the application is not comparable with the fall ploughed plots for the reason that, on this Station, spring ploughing usually gives higher yields than fall ploughing. However, this plot shows what yield may be obtained by this treatment. All of the other second-crop plots are comparable. There is a difference of 4 bushels and 58 pounds between ploughing rotted manure under in the fall and straight fall ploughing without manuring. Both the burning and discing of the stubble before fall ploughing have increased the yield.

Fresh manure applied during the winter on fall ploughing has not proved profitable. The volunteer growth from the grain and weed seeds has been noticeable but the rotting of the manure before applying eliminates the difficulty with weeds.

Rotted manure applied as a top-dressing on fall ploughing after seeding has resulted in a loss of 3 bushels and 41 pounds as compared with the same application before ploughing in the fall and a loss of 2 bushels and 23 pounds when compared with the yield from the unmanured plot.

As for application on summer-fallow, the topdressing with rotted manure after seeding has given 1 bushel and 6 pounds more than the fresh manure applied during the winter on summer-fallow.

MANURE TO AFFECT BARLEY

Applied to affect second crop after summer-fallow Rotation: Summer-fallow: oats; barley	Yield per acre			
	Barley			
	1922		Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.
Rotted manure in spring before ploughing	21	40	28	41
" in fall "	16	12	27	5
No manure, burn stubble, fall plough	–	–	23	38
Fresh manure in winter on fall ploughing	12	4	22	46
No manure disc before fall ploughing	–	–	20	18
No manure fall plough	12	32	18	17
Rotted manure after seeding on fall ploughing	17	32	17	43
FIRST CROP AFTER SUMMER-FALLOW				
Rotted manure after seeding on summer-fallow	14	36	23	9
Fresh manure in winter on summer-fallow	19	8	22	26

The rotted manure ploughed under in the fall has given a higher yield than any of the other fall ploughed plots. Rotted manure applied after seeding on fall ploughed land has resulted in even a lower average yield than no manure, although the 1922 yield shows an advantage in the application of manure. It is generally believed that manure should be ploughed under and this experiment indicates this very strongly. Discing the stubble before fall ploughing has resulted in an increased yield of 5 bushels and 21 pounds. On summer-fallow the application of rotted manure has given a higher yield than fresh manure applied during the winter.

MANURE TO AFFECT OATS

Applied to affect second crop after summer-fallow	Yield per acre			
	Oats			
	1922		Seven-year average	
	Bush.	Lbs.	Bush.	Lbs.
Rotted manure in spring before ploughing	36	4	58	17
Fresh manure in winter on fall ploughing	28	24	52	20
Rotted manure in fall before ploughing	30	20	51	31
No manure, burn stubble, fall plough	20	20	51	–
No manure, disc stubble, fall plough	27	2	48	28
Rotted manure after seeding on fall ploughing	27	2	48	3
No manure, fall plough	25	30	43	18
FIRST CROP AFTER SUMMER-FALLOW				
Fresh manure in winter on summer-fallow	48	8	50	22
Rotted manure after seeding on summer-fallow	39	22	47	33

The lowest yield of oats is from the plot receiving no manure or special treatment, which was the same in the case of wheat. The fresh manure applied in winter on fall ploughing has given a higher comparative yield than in case of wheat or barley. With this exception, the highest yield of oats on fall ploughing resulted from ploughing immediately after application of rotted manure. The top-dressing, or the application of rotted manure after seeding, has not proven profitable as compared with the plots not manured. Where the stubble was disced or burned before fall ploughing, the average yield has been considerably higher than on the fall ploughed plot receiving no manure or treatment. Even the top-dressing after the seeding, which is not considered the best method of application, has increased the yield over straight fall ploughing with no application of manure by 4 bushels and 19 pounds.

In applying manure on summer-fallow, fresh manure applied in winter has given an average of approximately 3 bushels more per acre than top-dressing with rotted manure after seeding.

This experiment shows the most profitable application to be on the stubble just before ploughing. Top-dressing should not be practised where it is at all possible to apply before ploughing. If it is desired to obtain clean seed, or if registered seed is being grown, nothing but well rotted manure should be used. However, if no noxious weeds are present, fresh manure may be applied previous to growing a feed crop. There is considerable loss in value of the manure in the process of fermentation but the destroying of viable weed seeds is necessary when growing clean crops.

Ploughing Under Green Crops

The object of this experiment is to ascertain the value of some green crops ploughed under as compared with the application of rotted barnyard manure. The land is ploughed early in June and the crops mentioned in the table below are seeded at once, and after reaching the specified stage of growth, are ploughed under.

FIRST CROP ON SUMMER-FALLOW

	Yield per acre			
	Wheat			
	1922		Eight-year average	
	Bush.	Lbs.	Bush.	Lbs.
Cultivated summer-fallow—rotted barnyard manure applied on fallow in September, 12 tons per acre	21	–	23	53
Cultivated summer-fallow, no manure	14	40	20	54
Peas seeded 2 bushels per acre, ploughed under when in blossom	11	–	19	40
Vetch seeded 1 bushel per acre ploughed under late July	12	40	18	46
Peas seeded 2 bushels per acre ploughed under early July	15	28	18	25

Any green crop grown on the summer-fallow seems to decrease the yield. The cultivated summer-fallow receiving no manure has given a higher average yield than any of the plots where a green crop was ploughed under. The rotted barn-yard manure has produced an increased yield of 4 bushels and 13 pounds as compared with the highest yield obtained by the ploughing under of any crop under test. The eight-year average shows that the growing of green crops on summer-fallow has reduced the yields as compared with summer-fallow receiving no manure of any kind.

SOIL PACKING

The soil packing experiment was completely revised in the spring of 1922. A résumé of the old experiment will be found in the report from this station for the year 1921. It was concluded from the old experiment that the surface packer gave at least as good results as the subsurface or combination packer, hence the two latter types are not used in the revised plan, but the surface packer is compared with the cultipacker and harrow.

The object of this experiment, in addition to comparing the two packers, is to ascertain the value of packing summer-fallow, spring ploughing and fall ploughing and to determine the most profitable time to pack each. The experiment was started in the spring of 1922, hence there are no figures available resulting from the packing of summer-fallow immediately after ploughing. However, the outline is shown below in full, giving the detailed treatment which will be followed in the future. The 1922 yields must not be taken as conclusive evidence in support of the advantages claimed for the implements under test.

PACKING SUMMER-FALLOW

	Yield per acre, 1922	
	Bush.	Lbs.
Extra harrowing after ploughing summer-fallow Cultipack after ploughing summer-fallow Surface pack after ploughing summer-fallow	See foot-note	
Extra harrowing before seeding	14	8
Cultipack before seeding	15	20
Surface pack before seeding	15	20
Extra harrowing after seeding	15	8
Cultipack after seeding	17	20
Surfaced pack after seeding	26	28
Harrow before and after seeding	22	–
Cultipack before and after seeding	22	–
Surface pack before and after seeding	16	40
Extra harrowing after ploughing fallow and after seeding Cultipack after ploughing fallow and after seeding Surface pack after ploughing fallow and after seeding	See foot-note	
Extra harrowing before seeding	See foot-note	
Cultipack before seeding	"	
Surface pack before seeding	17	20
Extra harrowing after seeding	17	28
Cultipack after seeding	16	20
Surface pack after seeding	15	48
Extra harrowing before and after seeding	18	8
Cultipack before and after seeding	See foot-note	
Surface pack before and after seeding	16	–

PACKING SPRING PLOUGHING

	Yield per acre, 1922	
	Bush.	Lbs.
Extra harrowing before seeding	13	20
Cultipack before seeding	13	40
Surface pack before seeding	14	–
Extra harrowing before seeding	11	50
Cultipack before seeding	14	8
Surface pack before seeding	15	48
Extra harrowing before seeding	12	–
Cultipack before seeding	16	8
Surface pack before seeding	16	40
	Bush.	Lbs.
Extra harrowing after seeding	17	–
Cultipack after seeding	16	28
Surface pack after seeding	15	–

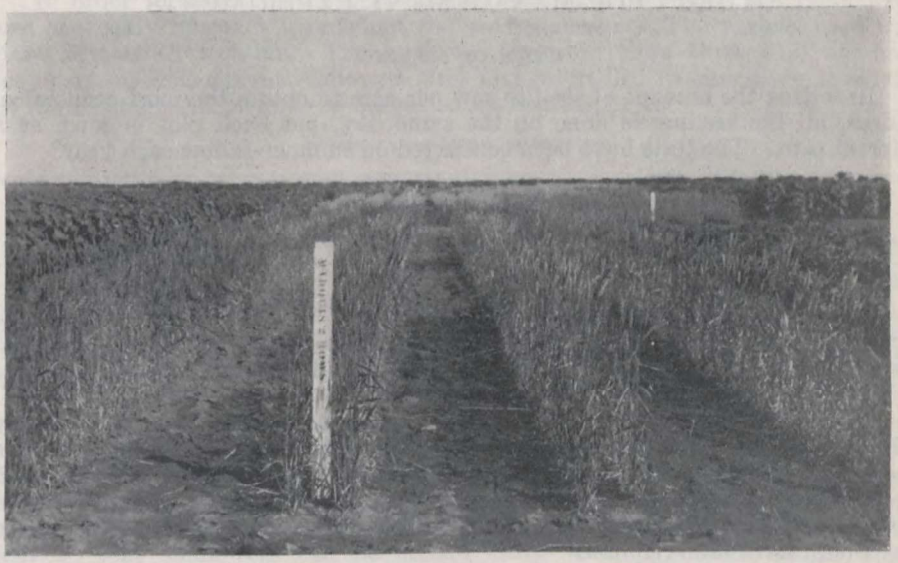
FOOT-NOTE.—No yields available representing a result of this treatment due to the changing from the old to the new plan of experiment.

PACKING FALL PLOUGHING

	Yield per acre, 1922	
	Bush.	Lbs.
Extra harrowing after fall ploughing	12	20
Cultipack after fall ploughing	14	8
Surface pack after fall ploughing	14	28
Extra harrowing before seeding	15	8
Cultipack before seeding	14	40
Surface pack before seeding	12	20
Extra harrowing after seeding	10	28
Cultipack after seeding	13	–
Surface pack after seeding	10	40
Extra harrowing before and after seeding	11	–
Cultipack before and after seeding	11	8
Surface pack before and after seeding	11	20

SUMMER-FALLOW SUBSTITUTES

The object of this experiment is to determine the possibility of growing some intertilled crop on summer-fallow and at the same time of conserving moisture and checking weeds satisfactorily. A comparison will be made with the common, bare summer-fallow. Wheat is to be grown on all plots in the second year of the rotation and an adjoining block of land will be used for the summer-fallow and summer-fallow substitutes as the first year of the rotation. The crops will be alternated on these two blocks from year to year making a two-year rotation.



Summer-fallow substitutes plots at Scott, 1922.

The crops used are as follows: Wheat—oats—barley—corn—sunflower and potatoes. The grain crops are grown in row groups of twos and threes, 42 inches from centre to centre of groups, and the other crops are grown in single rows 42 inches apart.

This experiment has been under way only one season hence the yields obtained thus far indicate nothing more than the relative number of bushels of grain

per acre which may be grown in rows as compared with growing in the usual way. The yields given below are, in each instance, average yields from two plots.

	Bush.	Lbs.
Wheat (two-row group)	9	24
Wheat (three-row group)	10	48
Oats (two-row group)	29	7
Oats (three-row group)	26	20
Barley (two-row group)	7	28
Barley (three-row group)	13	26

Marquis wheat, Banner oats and Duckbill barley were the varieties used and the yield from the same varieties on the variety test plots, sown in the usual way, were as follows (average of two plots):—

	Bush.	Lbs.
Marquis wheat	15	2
Banner oats	46	16
Duckbill barley	14	28

These yields show the effect of the very dry growing season of 1922. The variety tests were located some distance from the intertilled crops but in both cases the land was summer-fallowed the previous season and there was no noticeable difference in the kind of soil. These yields are given simply to afford some comparison between the yields obtained from cultivating the grain sown in row groups and seeding in the usual way six inches apart.

OTHER CROP MANAGEMENT EXPERIMENTS

RATES OF SEEDING

In testing the amount of seed to sow per acre to obtain the most economical returns, all the seeding is done on the same day, but each plot is sown at a different rate. The tests have been conducted on summer-fallow each year.

WHEAT—RATES OF SEEDING

	Yield per acre Five-year average Bush.	Lbs.
¾ bushel per acre	24	40
1 " "	24	4
1¼ " "	24	6
1½ " "	25	2
1¾ " "	24	8
2 " "	25	11

The yields of wheat from the several rates of seeding have been fairly uniform for the five-year period. While three-quarters of a bushel per acre has given the most economical returns, it must be borne in mind that the seed used was of the best and that the soil was in ideal condition. Had the seed beeen weak in germinating power or the soil poorly prepared or very dry, more seed would have been required

It was observed that thin seeding permitted a stronger growth of weeds. Three-quarters of a bushel of wheat per acre scarcely makes possible a uniform distribution of seed.

Another factor worth considering is that the above average is made up from yields obtained during comparatively dry seasons. Had one or two moist seasons intervened it is probable that the average would have been in favour of heavier seeding.

OATS—RATES OF SEEDING

	Yield per acre Eight-year average Bush.	Lbs.
1 bushel per acre	57	13
1½ " "	60	8
2 " "	62	33
2½ " "	64	29
3 " "	62	30

Two and one-half bushels per acre seems to be the most advisable rate to seed oats. If the seed is very expensive in the spring and feed scarce, it may be advisable to sow two bushels rather than two and one-half. Only seed germinating 90 per cent and upward was used in this experiment.

BARLEY—RATES OF SEEDING

	Yield per acre Seven-year average Bush.	Lbs.
1 bushel per acre	22	19
1½ " "	22	47
2 " "	22	27
2½ " "	21	27
3 " "	21	21

One and one-half bushels resulted in slightly the highest yield; a decrease with either heavier or lighter seeding was shown.

Only seed germinating from 90 per cent and upward was used in this experiment.

DATES OF SEEDING SUNFLOWERS

In order to ascertain the best date of seeding sunflowers, five plots were sown at weekly intervals throughout the seeding season. The variety used was Giant Mammoth Russian. The seed was sown in rows three and one-half feet apart on well summer-fallowed land and intertilled as necessary throughout the season. All plots were harvested on September 13.

SUNFLOWERS—DATES OF SEEDING

—	Height of plants	Stage of maturity	Yield per acre green weight	
	Inches		Tons	Lbs.
April 15	84	Early flowering	10	864
" 22	84	" "	9	1,072
" 29	72	Heading	6	1,504
May 6	72	"	4	1,248
" 15	66	Early flowering	3	1,200

The yield of fodder in 1922 has been in direct proportion to the earliness of seeding. The difference in yields, however, in favour of early seeding is rather pronounced, and is hardly indicative of what may be expected in a normal season with moderate rainfall. An outstanding feature of this experiment is, that sunflowers can be seeded early without serious danger from frost. It is on record on this Station that sunflowers in the two-leaf stage withstood, with comparatively little injury, 12 degrees of frost (20°F.), on June 1, 1919. The sunflower seed germinates at a lower temperature, consequently, there is little danger of the seed rotting in the ground.

METHODS OF SEEDING SUNFLOWERS

The object of this experiment is to determine the most suitable distance between the rows, and also the distance between plants in the row.

The seed was sown with the ordinary grain drill, the intervening spouts being closed. The plots were sown on May 20 on well summer-fallowed land and harvested on September 8. The following yields were obtained:—

SUNFLOWERS—METHODS OF SEEDING

Distance between plants in the rows	Yield of green fodder per acre							
	Rows 24″ apart		Rows 30″ apart		Rows 36″ apart		Average yield	
	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
Thinned to 12 inches apart	7	894	8	1,052	8	1,133	8	360
" 9 "	6	542	7	442	7	955	6	1,980
" 6 "	6	106	6	312	6	1,987	6	802
Average yield from three plots	6	1,181	7	602	7	1,358	7	381

This year's results would indicate that maximum yields are obtained when plenty of room is allowed for each individual plant, and conversely, that the greater the number of plants per unit area, the smaller the yield.

The results obtained in the two preceding seasons, though less uniform, would indicate exactly the opposite. These seemingly contradictory results may be partly explained by the precipitation during the growing season. Owing to the continued drought throughout the season in 1922, and the consequent scarcity of soil moisture, the wider spacings and the thin planting showed more advantageously than did the closer planting; whilst the more favourable moisture conditions in the two preceding seasons produced a higher tonnage of green fodder per acre. Since a prolonged drought may occur at any time during the growing season, and a timely rainfall cannot be depended upon, spacing the rows at least 36 inches apart, with the plants about 9 inches apart in the row, is recommended. This opinion is further strengthened by the fact that the wider spacings afford a better chance for cultivation and are consequently more effective in weed control.

TIME OF CUTTING SUNFLOWERS

An experiment was started this season to ascertain the effect of late cutting on the stage of maturity and the total yield. A field of sunflowers was divided into two parts. A portion of the field, .77 of an acre, was cut on September 12 and yielded at the rate of 6 tons and 400 pounds per acre, green weight, and the remainder, 2·32 acres, was cut on September 19, the yield being 6 tons and 1,340 pounds per acre.

On September 12 the plants were about 2 per cent in bloom and on September 19, they had reached about 10 per cent in bloom. Seven degrees of frost (25° F.) occurred on the night of the 15th, which injured the outside rows to some extent but had less effect on the centre of the field. The increased yield in favour of the later cutting was approximately one-half ton per acre and, presumably, would have been higher in the absence of frost. The field in question was sown comparatively late, May 30, and it is hoped that, by practising earlier seeding, the Giant Russian variety of sunflowers will reach about 20 per cent in bloom by the middle of September, at which stage the sunflowers will make excellent ensilage and, in addition, the total yield is increased.

SHRINKAGE IN SUNFLOWERS AFTER CUTTING

An experiment has been underway for three years to determine the percentage of shrinkage in sunflowers from the time of cutting until put into the silo. In this experiment several representative sheaves of sunflowers are weighed as soon as cut and left on the ground between weighings.

This season the weighings were made at intervals of 24 hours for a period of three days. For the first 12 hours of this experiment, rains prevented rapid shrinkage of the sunflowers, while the second and third day the drying process was more rapid.

PER CENT SHRINKAGE OF ENSILAGE CROPS BEFORE ENSILING

	Sunflowers			Corn
	1920 6 sheaves	1921 15 sheaves	1922 6 sheaves	1921 15 sheaves
	Lbs.	Lbs.	Lbs.	Lbs.
Weight of sheaves at time of cutting	332	448	225	296
" " 24 hours after cutting	.....	390	214	200
" " 48 " "	226	.....	193	
" " 64 " "	.....	.....	173	
" " 6 days "	.....	315	.....	172
	Per cent	Per cent	Per cent	Per cent
Per cent shrinkage in 24 hours	.....	12·7	4·8	32·4
" " 48 "	31·9	.....	14·1	
" " 64 "	.....	.....	23·1	
" " 5 days	.....	25·2	.....	41·8

While there is little experimental data on the optimum moisture content of ensilage crops at ensiling time, it is evident from data collected that a certain amount of drying is necessary in most years before ensiling. The time required depends on the kind of crop, the stage of maturity, the rate of evaporation during the drying period and the amount of rainfall previous to cutting. Ensilage crops at this Station are usually harvested the first week in September, after which time a killing frost may occur. Sunflowers are more frost resistant than corn, and hence may be cut later. In the future it is proposed to harvest sunflowers about the middle of September.

The average stage of maturity of sunflowers at this Station, when harvested, has been about 10 per cent in bloom and the field varieties of corn have usually reached the early silk stage; consequently the percentage of moisture is relatively high. According to comparative data secured in 1921, corn loses its moisture much more rapidly than sunflowers after cutting, and hence the latter have to be dried for a longer period before ensiling. An attempt should be made to dry the sunflowers sufficiently to avoid excessive seepage from the silo, which is in direct proportion to the percentage of moisture in the plants when put into the silo.

An indication of the amount of moisture in certain crops at the time of ensiling can be found by reference to the table entitled "Dry Matter Content of Ensilage Crops."

COMPARATIVE YIELDS OF ENSILAGE CROPS

The object of this experiment is to determine the comparative yields of the commonly used ensilage crops, under field conditions. These crops were grown side by side on a uniform tract of spring-ploughed stubble land, manured the previous fall at the rate of 12 tons per acre. The sunflowers and corn, respectively, were sown in rows 42 inches apart and inter-tilled throughout the season. The mixture of oats and peas was sown with an ordinary grain drill at the rate of 1½ bushels of each per acre. The oats predominated in the mixture, which agrees with previous results at this Station, when oats and peas

were sown in equal quantities. The comparative yields of these crops were as follows:—

COMPARATIVE YIELDS OF ENSILAGE CROPS

Variety	Date sown	Date harvested	Stage of maturity	Yield of crops per acre, green weight	
				Tons	Lbs.
Sunflowers	May 20	Sept. 9	10 per cent in bloom	6	1,349
Corn	" 21	" 8	Early milk	6	645
Oats and peas	June 11	" 9	Oats firm dough / Peas pods formed	2	1,693

The sunflowers yield a heavier tonnage per acre than corn and are a more dependable crop in this district. There is, however, this disadvantage, that sunflowers can only be utilized as silage, while corn can be successfully fed as dry corn fodder. Oats and peas form a very palatable hay mixture and give fair returns in normal seasons.

DRY MATTER CONTENT OF ENSILAGE CROPS

An analysis was made of the three ensilage crops to determine the dry matter content. The samples were taken at the time of ensiling the crops. The succeeding table gives the particulars obtained:—

Samples of silage	Weight of sample	Weight of sample oven dried	Weight of moisture in sample	Per cent of moisture in sample	Per cent of dry matter in sample
Sunflowers	759·5	156·0	603·5	79·5	20·5
Oats and peas	422·0	142·5	279·5	66·2	33·8
Corn	668·0	104·5	563·5	84·4	15·6

DATES OF SEEDING FALL RYE

There appears to be considerable difference of opinion as to the effect of early seeding of fall rye or the successful wintering of this crop.

In the summer of 1920, an experiment was started to determine, if possible, the best time to sow fall rye on land that had been worked as summer-fallow until the time of seeding. The crop was harvested in 1921 and showed that seeding on August 21 had given heavier yields than earlier seeding. The experiment was repeated in the following season. The crops harvested during the past year showed that the crop sown on July 15 produced the best returns, the yields becoming less with each week's delay in seeding. These results, while they do not clear up the point under investigation, show that the condition of the soil is the main factor in determining the time to sow fall rye. One observation, while based on another experiment, may be made here and that is that early seeding permits pasturing the crop to some extent.

DATES OF SEEDING SPRING GRAIN CROP

Ten years' work with dates of seeding spring-sown cereals shows that the influence of the season, as with fall rye, is the main controlling factor. In some years, wheat, oats, and barley sown early give the best yields, while in other years later seeding has proven more profitable. The tabulated results show one point, i.e.—that the order in which these cereals are commonly sown—wheat, oats and barley—is the proper one.

In five years out of ten, wheat sown about May 1 has given the best yields. The returns from the experiments with oats show less uniformity, but the first two weeks in May seems to be a favourable time. Barley evidently does better with later seeding than do the other cereals. This may be due in part to the barley being more easily damaged by spring frosts.

GAS GRAIN PICKLER

This apparatus for treating seed grain for smut was sent to the Station for trial. It consisted of an ordinary kerosene lamp burning inside a galvanized iron container. The chemical used is known as "paraformaldehyde" and is heated by the lamp. The gas liberated is conveyed through a long perforated pipe into the pile of grain. The plan recommended was to put the pipe through a hole bored in the end board of a wagon box. The box full of grain was to be treated in one operation.

In the experiment conducted at Scott the grain was piled on the granary floor on top of the perforated pipe and the lamp was just outside the door.

In the first trial the measure was filled one-third full of the "paraformaldehyde" and the lamp was allowed to burn one-half hour. It was found at the end of this period that only part of the chemical had been used. In the second test at the end of three-quarters of an hour no traces of gas could be detected in the grain by ordinary methods although the grain was covered with a heavy canvas for two hours. An automobile air pump was used to force the liberated gas into the pile of grain which at no place exceeded a depth of two feet.

During the season of 1922 the test of this method of treating grain was repeated in co-operation with the officer in charge of the Dominion Laboratory of Plant Pathology at Saskatoon.

The grain used was Marquis, badly smutted. The treatment was given in the laboratory and the crop grown at Scott. A count made of smutted heads showed none present in the plot where formaldehyde treated seed was sown; three per cent where the gas treatment seed was used, with 5·4 per cent in the check plot.

Tests have shown that there is a danger of the germinability of the seed near the pipe being destroyed or weakened and the smut in some other parts of the pile not being destroyed.

HORTICULTURE

The summer season of 1922 has been the driest on record at this Station. From May 15 to August 1 the total precipitation only amounted to 1.44 inches, while the normal precipitation for this period is 5·28 inches. There was one shower, on June 17, that was particularly beneficial to the vegetable and flower plants which had just been transplanted from the hotbeds. The rain on August 16, of two inches in 24 hours, was badly needed and proved most beneficial to all later-maturing vegetables.

In the tests of vegetables this year, seed sold in Western Canada has mainly been used. A few of the newer sorts grown or sold by other seedsmen have been introduced, and, in addition, some strains of seed that have been grown on the Scott Station and on the Central and other Experimental Farms have been tested out.

VEGETABLES

ASPARAGUS

The first asparagus was cut on May 25 and from that date to June 15, seventeen cuttings were taken from the old bed. This bed has been producing for several years and gave its heaviest crop during the past spring. The bed is kept free from grass and weeds and is well fertilized with thoroughly rotted barnyard manure. This can be worked into the soil with the garden cultivator although an occasional spading will be found beneficial.

STRING BEANS

Twenty-one strains and varieties were sown on June 7. The plants emerged June 16. Most of the seed was sent from the Horticultural Division, Central Experimental Farm. The following table gives the particulars regarding the origin of the seed and the yields obtained:—

BEANS—TEST OF VARIETIES

Variety	Seedsman	First fit for use	Yield green pods 40 square feet		Remarks
			Lbs.	Oz.	
Masterpiece	Ottawa 1916	Aug. 12	11	15½	Eight-inch pod, slightly stringy.
Early Valentine	Scott Exp. Station	" 11	11	–	Short pods—tender.
Pencil Pod B. Wax	" "	" 9	10	12	" "
" "	Ottawa 1642	" 4	9	9	" extra tender.
Ex. Early Valentine	" 1532	" 10	9	4	Pods 4½ inches, good bean.
Davis White Wax	" 1636	" 9	9	–	Pods 4 inches, tender.
Plentiful French	" 1639	" 9	8	11	Inferior quality.
Round Pod Kidney Wax	" 1638	" 12	8	6	Pods 6 inches—one of the best table beans.
Yellow Eye	" 1643	" 5	8	6	Medium flavour—tender.
Bountiful Green Bush	" 1633	" 8	8	5	Good flavour—free from stringiness.
Grenells Rustless	Scott Exp. Station	" 10	8	4	Short pod.
Norwegian	" "	" 8	7	2	Field bean—tough.
Improved Golden Wax	Steele Briggs	" 3	7	1	Mild flavour—tough.
Grenells Rustless	Ottawa 1628	" 7	6	12	Flavour good—stringy.
Fordhook Favorite	" 1641	" 12	6	8	" tender.
Wardwells Kidney Wax	" 1634	" 5	6	1	Flavour excellent, tender.
Stringless Green Pod	" 1630	" 11	5	9	Short pods.
Challenge Black Wax	" 1915	" 11	4	12	One of the earliest.
Kentucky Wonder	" 1689	" 21	3	2	Too late.
Hodson Long Pod	" 1635	" 23	2	14	"
Refugee or 1000 to 1	" 1621	" 8	1	1	"

The variety Masterpiece has, during the past three seasons, been near the top of the list in yield. This season the pods were slightly stringy. Extra Early Valentine is another sort that has yielded well. While it is a good plan to grow both early maturing varieties and later sorts so as to lengthen the season, the last three varieties in the table appear too late to produce even a fair yield.

TABLE BEETS

Seven strains and varieties of table beets were grown. Since, in some seasons, spring frosts have destroyed the young beets, seeding was delayed until May 27. The first beets were fit for table use on August 8.

TABLE BEETS—TEST OF VARIETIES

Variety	Seedsman	Yield from 80 square feet	Remarks
		Lbs.	
Detroit Dark Red	Wright	101	Even size, good quality.
" "	McKenzie	90	Large and coarse.
Early Blood Red	S. Briggs	90	Uniform beets, good quality.
Early Model	"	81	Tender, flesh too light coloured.
Eclipse	McKenzie	80	Not uniform, inferior quality.
New Dandy	S. Briggs	61	Uneven in shape, good qualuty.
Long Smooth B. Red	"	58	Dark colour, too long for harvesting.

Detroit Dark Red appears to be a good table beet. The strain of this variety that produced the heavier yield was received for test from a local seed grower.

BRUSSELS SPROUTS

Only one variety of Brussels sprouts, Dalkeith, was grown. The plants were started in the hotbed and were planted in the garden on June 5. The sprouts were not fit for use until September 23, and at that time were rather open, uneven in size, and of poor quality.

BORECOLE OR KALE

The Green Curled Scotch variety was grown. It made a strong growth for the season. The foliage was rather coarse and strong-flavoured when prepared for the table.

CAULIFLOWER

Six strains and varieties of cauliflower were started in the hotbed and transplanted to the garden on June 5. The dry season affected the cauliflower possibly more than any other vegetable crop. The yields were low and the table test showed all the cauliflower varieties to have a stronger flavour than usual.

CAULIFLOWER—TEST OF VARIETIES

Variety	Seedsman	Weight ten average heads	Remarks
		Lbs.	
Early Snowball	McDonald	32	No table test.
Earliest Snowball	S. Briggs	30	Very strong flavour.
Snowball	McKenzie	29	Medium flavour and texture.
Snowcap	"	29	Flavour and texture medium.
Early Dwarf Erfurt	"	27	Rather strong flavour, medium texture.
Dwarf Erfurt	"	27	No table test.

It will be noted that the strains of the Snowball variety produced the heaviest crops.

CABBAGE

Sixteen varieties and strains of green cabbage and two of red were started in the hotbeds on April 13, and transplanted to the gardens on May 6. Considering the dry weather, the cabbage made good growth.

CABBAGE—TEST OF VARIETIES

Variety	Seedsman	Yield from ten average heads
		Lbs.
Green Cabbage—		
Kildonan	Steele Briggs	65
Flat Swedish	Lennoxville Exp. Station	60
Glory of Enkhuizen	Steele Briggs	60
Northern Favorite	"	52
Danish Ballhead	McKenzie	48
Copenhagen Market	Graham	47
Jersey Wakefield	McDonald	45
Danish Ballhead	Ottawa 1193	45
Autumn King	Steele Briggs	45
Copenhagen Market	"	45
Northern Favorite	McKenzie 1921 seed)	43
Danish Ballhead	Ottawa 934-2-3	40
Danish Ballhead	Steele Briggs	38
Winnigstadt	"	37
Jersey Wakefield	"	30
Succession	Ewing	27
Red Cabbage—		
Danish Stonehead	McKenzie	35
Mammoth Red Rock	Steele Briggs	30

Two Chinese varieties of cabbage, Wong Bok and Pe Tsai, were grown. These varieties mature early, consequently do not form a head and the leaves are used as greens. The cooking test showed both sorts to have a strong flavour but the former was slightly superior in quality.

CUCUMBERS

Six varieties of cucumber were planted in the hotbeds on May 9, and transplanted to hills in the garden on June 16. In addition, seeds from the same packets were sown in the garden in rows on June 6. By the 16, practically all the varieties sown outside had emerged. The plants were thinned to six inches apart in the row. The plants started in the hotbeds produced a very light crop, while the plants started in the open gave fair returns. This may have been partly due to the wind having a less damaging effect on the more closely planted rows. The Early Russian variety, followed by Earliest of All, gave the best yields.

CARROTS

Eight lots of carrots were tested. As usual at this station, good yields were obtained, and, for the most part, the carrots were of excellent quality. The seed was sown on May 15, and the crop harvested on October 3.

CARROTS—TEST OF VARIETIES

Variety	Seedsman	Yield from 80 square feet	Remarks
		Lbs.	
Chantenay	McKenzie	70	Shapely, coarse grain.
Danvers Half Long	S. Briggs	63	Uneven in size.
Chantenay	"	58	"
Garden Gem	McKenzie	54	"
Rubicon	S. Briggs	49	Shapely, roots uniform.
Oxheart	"	47	Shapely roots, uniform.
Scarlet Nantes	McKenzie	45	" "
Chantenay	Ottawa 20-6-19	45	" " very uniform.

CELERY

Since the moisture requirement of this vegetable is high and no artificial watering is practised on this station, celery has not thrived well. This year only three varieties were grown. The yield from 133 square feet only amounted to 20 pounds from the Giant Pascal; 14 pounds from the White Plume and 16 pounds from the Golden Self Blanching. The yields from the Giant Pascal were at the rate of about two tons per acre. This is a light yield and the stalks were quite stringy.

CITRON

Only the variety Red Seeded was grown. The seed was started in the hotbed on May 9, and the young plants were set out in the garden on June 7. The yields from plants started outside were about five times as great as from the transplanted plants. This experiment will be continued for several seasons before any definite conclusion as to the value of starting in a hotbed can be determined.

GARDEN CORN

Garden corn is becoming a staple vegetable in quite a number of gardens in this province. Only the very earliest sorts appear of value here owing to the short summer season. The corn was planted on May 29. The first corn fit for use was No. 74 on August 17, or 80 days after planting.

CORN—TEST OF VARIETIES

Variety	Seedsman	Total number cobs from 100 square feet	Remarks
Howes Alberta Flint	S. Exp. Station.	358	Medium quality, yellow kernel
No. 74	" ..	280	" "
Pickaninny A	" ..	252	Good quality, short cobs, black kernels.
Assiniboine	" ..	159	Medium quality.
Squaw	" ..	153	Inferior quality.
Nuetta	Wills	151	Medium quality.
Assiniboine Red	S. Exp. Station.	140	Inferior quality.
Squaw	McKenzie No. 1	138	"
Early Jewel	Wills	132	Late for this district.
Early July	McKenzie	128	Too late for this district.
Assiniboine	Wills	122	Inferior quality.
Pickaninny	Ottawa 54-20	114	Extra good flavour, deep kernels.
Squaw	McKenzie No. 2	113	Inferior quality.
Sweet Kloochman	S. Exp. Station.	88	Medium quality.
Early Malcolm	Ottawa 1718	86	Late for this district.
Early Dakota	Wills	82	"
Kloochman	Ottawa 869	81	Medium quality.
Sweet Squaw	Ottawa 1445-7	72	Late for this district.
Golden Bantam	Steele Briggs	41	Few cobs reached good roasting stage—too late.

LETTUCE

Ten strains of lettuce were sown in the garden on May 17. The seed germinated well and an even stand of plants was obtained. The plants were thinned out on June 6. The Iceberg was the first variety fit for use. Of the three types grown, the head lettuce was much to be preferred to either the leaf or the Cos lettuce. Improved Hanson and Denver Market were two of the most popular varieties.

ONIONS

Onions have seldom produced a crop sufficiently mature to keep well during the winter. With a view of determining the value of sets for producing onions, Dutch sets were obtained from five different sources. The yields generally were below those obtained from seed onions, although the bulbs were more nearly ripe at harvest time.

In addition each lot of sets was divided into three groups according to size. The results from this experiment showed that the larger the set the heavier the returns at harvest time.

Thirteen varieties of onion were sown on May 17. Of these Ailsa Craig from Steele Briggs Seed Company, and Yellow Globe Danvers and Large Red Wethersfield from the Central Experimental Farm gave the best yields.

GARDEN PEAS

Garden peas thrive well in this district; good yields are obtained and both the green peas and ripe seed are of excellent quality. The number of varieties listed for sale is extensive and, in this year's tests, 24 different lots were tried. The rows were 36 inches apart and in the test of varieties the seed was put in with one inch between seeds.

GARDEN PEAS—TEST OF VARIETIES

Variety	Season	Yield green peas in pod 45 square feet		Remarks
		Lbs.	Oz.	
Laxtonian	July 19 to July 25	8	6	Excellent quality.
Little Marvel	" 15 " " 25	8	5	Very good quality, good flavour.
Reliance	" 27 " Aug. 4	7	14	Small peas, very tender.
Danby Stratagem	" 29 " " 9	7	14	Very good quality, large peas.
Sutton Excelsior	" 25 " July 27	7	13	
McLean Advancer	" 27 " " 31	7	4	Medium quality, small peas.
Homesteader	" 25 " " 27	6	12	
Thos. Laxton	" 13 " " 19	6	10	
Western Beauty	" 22 " " 27	6	9	Flavour good, quality medium.
Gradus	" 17 " " 25	6	6	Good quality.
Peter Pan	" 18 " " 27	6	5	"
American Wonder	" 22 " " 27	6	5	
Lincoln	" 26 " Aug. 4	6	3	
Gregory Surprise	" 15 " July 25	6	2	
Early Morn	" 14 " " 27	6	–	
Blue Bantam	" 24 " " 27	6	–	
Harrison Glory	" 29 " Aug. 4	5	15	Inferior quality, too dry.
American Wonder S.B	" 24 " July 27	5	13	
English Wonder 0-1644	" 17 " " 27	5	10½	
English Wonder (Scott)	" 21 " " 25	5	10	
Pioneer	" 21 " " 27	5	9	
Sherwood	" 28 " 31	4	12	Medium quality.
Sidney 2360	" 20 " " 27	4	9	
Telephone	" 26 " Aug. 4	4	8	Quality good, skin rather tough.
Champion of England	" 31 " " 23	4	1	Excellent quality.
Eight Weeks	" 20	2	4	

GARDEN PEAS—DOUBLE ROW SYSTEM

The plan followed in this is to plant two rows close together and cultivate between each pair of rows. The objects of the experiment are to lessen the wind damage to the crop and to determine the yields where no artificial watering is practised. The succeeding table gives the particulars regarding the

comparative yields. The variety Thos. Laxton was used and the plots were sown on May 17.

Distance apart for double rows	Season fit for use	Yield from 45 square feet	
		Lbs.	Oz.
Single rows	July 13 to July 27	6	10
Double row 2" between rows	" 11 " " 19	6	9
Double " 4" "	" 11 " " 27	6	14½
Double " 6" "	" 11 " " 27	7	10

Under conditions such as existed at Scott this year it appears to be advisable to separate the two rows by a six-inch space. Where watering is practised, closer spacing may be advisable.

PARSNIPS

Seed of eight different strains and varieties of parsnips was sown in the test plots on May 18. The plants emerged on June 4 and were thinned out on July 10th. The crop was harvested on October 6.

PARSNIPS—TEST OF VARIETIES

Variety	Seedman	Yield from 82 square feet	
		Lbs.	Oz.
Hollow Crown	Ottawa 1046	37	7
Elcombe Giant	Steele Briggs	37	3
Manitoba Intermediate	McKenzie	36	14
Hollow Crown	"	35	4
Student	Steele Briggs	34	14
Guernsey	"	34	8
Hollow Crown	Wright	33	2
Hollow Crown	Steele Briggs	32	2

It will be observed that the selection made from Hollow Crown by the Horticultural Division at Ottawa gave the best yield. This illustrates the importance of careful selection of vegetable seed. The Elcombe Giant proved to be of poor texture. While the Manitoba Intermediate was fine in texture and sweet flavoured, it had unusually long roots which made it difficult to harvest.

PEPPERS

Two varieties of peppers were grown. The seed was obtained from the Summerland, B.C. Experimental Station. The Neapolitan considerably out-yielded Harris' Extra Early.

PUMPKINS

Five varieties of pumpkins were grown. The plants were started in the hot-beds and transplanted to the garden on June 16. Seed of the same varieties sown out-of-doors on June 8 emerged on June 26th. The only variety, sown in the open, which bore fruit was the Connecticut Field, the seed of which was obtained from the McDonald Seed Company. It also gave heavier yields from the plants started in the hotbed than did any other sort. Quaker Pie proved too late for this district and Large Cheese gave practically no returns.

RADISH

Six varieties of radish seed were sown. The Early Scarlet Ball was the first variety fit for use. The Early Scarlet White Tip was second in point of earliness. It is one of the best sorts tested.

SPINACH

Three different types of spinach were grown. The Victoria spinach was fit for use on July 3. The Swiss Chard on July 5 and the New Zealand spinach on July 27. These three sorts gave quite a variety of greens. The last two varieties continued fit for use until fairly late in the season.

SALSIFY

The variety of salsify known as Mammoth Sandwich Island was grown. The yield was a little less than a pound per square foot of space. The roots were only of fair size and were rather prongy.

MARROWS

Two varieties of marrows were started in the hotbed and seed of the same varieties was sown in the open. From the English Vegetable marrow more than double the yields were obtained from the plants started in the hotbed while from the White Bush equal yields were obtained from the plants started in the hotbed and those started in the open.

SQUASH

Six varieties and strains of squash were grown. Transplanting plants from the hotbed was tested out. With all six varieties, plants started in the garden out-yielded the transplanted ones. The Early Orange marrow gave the heaviest yield. The Green Hubbard is a marrow of excellent quality.

TOMATOES

The work with tomatoes consisted mainly in testing early and medium early ripening varieties. In addition, several methods of pruning were tried. The seed was sown in the hotbeds on April 3 and the plants were set out in the garden June 16.

TOMATOES—TEST OF VARIETIES

Variety	Seedsman	First fruit ripe	Total yield from eight plants	
			Lbs.	Oz.
Red Head	Langdon	Sept. 2	23	12
First of All	McKenzie	" 2	22	15
John Baer	Ottawa 708	" 2	21	7½
Bonny Best	Carter	No fruit ripened outside.	19	8
Alacrity	Ottawa 18-15-29	Aug. 28	18	8½
Danish Export	Ottawa 869-73	" 28	17	15
Early Jewel	McKenzie	Sept. 2	17	6
Bonny Best	Stokes	" 7	17	6
Sunrise	Steele Briggs	" 2	16	2
Crimson Canner	Ottawa 707	Aug. 12	15	14
Earliest of All	Steele Briggs	Sept. 7	14	9½
Alacrity	McKenzie	Aug. 12	13	6½
Early Atlantic	"	No fruit ripened outside.	13	1
Earliana	Steele Briggs	Aug. 23	12	8

Crimson Canner is quite early, the fruit is of good size and smooth. Alacrity has not as pleasing an appearance as the Crimson Canner.

Ripening Tomatoes Indoors

Green fruit of all varieties of tomatoes was brought inside. Some lots were ripened in a sunny window, others in hay or in boxes and one lot was ripened in an air-tight box. This last was accomplished by placing the tomatoes in a close-fitting cardboard box, and several thicknesses of paper were then wrapped around the box. Records were kept of the quantities weighed in at the commencement of the experiment and of the ripe fruit removed

Test of methods of pruning tomatoes, Scott, 1922.

and of waste fruit. The lot in the air-tight box was slower ripening but there was comparatively little waste fruit, while some sorts in the windows and in the open boxes showed considerable loss. The variety Red Head ripened, in a box covered with hay, with a loss of 15 per cent.

POTATOES

A number of varieties of potatoes that were grown on the Station for a number of years have been discarded. These have been replaced by varieties that have not hitherto been grown on the Station. Considering the unfavourable season, good yields were obtained. This may be accounted for by the fact that the test of varieties was conducted in an enclosure surrounded by tree plantations while the cultural tests were conducted in the open.

POTATOES—TEST OF VARIETIES INSIDE WINDBREAKS

Variety	Marketable		Unmarketable		Total yields	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
American Wonder	322	18	26	24	358	42
Carman No. 1	320	6	29	42	349	48
Gold Coin	302	30	30	48	333	18
Empire State	299	12	20	54	320	6
Wee McGregor	297	5	23	6	320	11
Burnaby Mammoth	297	6	23	6	320	12
Green Mountain	284	58	25	18	310	16
Irish Cobbler (Rosthern)	275	..	23	6	298	6
Prince Albany	272	48	22	..	294	48
Majestic	266	17	41	48	308	5
Everitt	264	..	35	12	299	12
White City	259	12	43	28	302	40
Ashleaf Kidney	250	51	18	42	269	33
Rochester Rose	248	36	37	24	286	..
Dreer Standard	246	24	22	..	268	24
Country Gentleman	246	24	19	48	266	12
Gold Nugget	244	12	24	12	268	24
King Edward	236	30	47	50	284	20
Early Eureka	236	18	26	24	262	42
Carter Early Favorite	232	..	25	18	257	18
Bovee	220	..	30	58	250	58
Duchess of Norfolk	212	20	33	..	245	20
Northern Rose	202	24	30	48	253	12
Epicure	200	12	26	24	226	36
Superlative	198	..	30	48	228	48
Morgan Seedling	172	42	20	54	193	36
Early Ohio	172	42	19	48	192	30
Ninety Fold	165	..	25	18	190	18
Early Acme	146	18	16	30	162	48
Duke of York	134	12	22	..	156	12

Potatoes—Hills vs. Rows

A test was started to determine the advisability of growing potatoes in hills so that cultivation both lengthways and crossways was possible. Cultivation done in this way decreases considerably the cost of hand hoeing. The following table gives the comparative yields from using different numbers of sets in the hills and also shows the yields per acre from the hills and rows. The potatoes were planted on May 23 and harvested on September 26. The hills were 36 inches apart each way and the rows were 36 inches apart and the sets 12 inches apart in the rows. The variety Gold Nugget was used for this experiment.

POTATOES—HILLS *vs.* ROWS

———	Marketable		Unmarketable		Total yield	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1. Rows	132	55	5	19	138	14
2. Hills, 3 sets in each	112	..	8	20	130	20
3. Hills, 2 sets in each	104	20	6	20	110	40
4. Hills, 1 set in each	72	40	1	40	74	20

In plots one and two the same quantity of seed was used but the yield is in favour of the row system, the returns showing a heavier yield with fewer small potatoes. With lesser amounts of seed, lesser yields were obtained in both the other two plots.

Potatoes—Kind of Sets

A test to determine the advisability of cutting the potatoes for sets was commenced. Two varieties were used. One lot of each variety was planted whole; in the other lots the tubers were cut to sets having three eyes each.

Kind of Sets	Yield per Acre			
	Wee MacGregor		Everitt	
	Bush.	Lbs.	Bush.	Lbs.
Whole potatoes	162	14	136	33
Tubers cut to three eyes in sets	145	15	159	18

Sprouting Potatoes Before Planting

The Everitt variety of potatoes was used for this experiment. The potatoes were put in the loft of the cattle barn about six weeks before planting. At time of planting there were quite vigorous-looking, short, green sprouts on the uppermost end of the tubers. Potatoes taken direct from the cellar were compared with these. The sprouted seed gave a yield of 171 bushels 50 pounds or an increase in favour of sprouting of 35 bushels per acre.

Cutting Potato Sets Before Planting Time

Sets of the Everitt variety were cut two weeks before planting and these were planted to compare with the yields from sets cut the same day that they were planted. The yields showed an increase from the freshly-cut sets of 53 bushels per acre over the sets cut two weeks earlier.

Influence of Windbreaks on Yields of Potatoes

Comparative yields from potatoes grown inside windbreaks with those grown under field conditions have shown the value of protection from the winds and the influence of the additional moisture secured from the snow collected during the winter.

In the first season, the plot inside the hedges had received no fertilizer, in the last two seasons the effect of manuring may have increased the returns from the plots inside the shelter belts but not sufficiently to account for the increased yields obtained. This work has now been under way for a period of three years and the comparative figures secured are as follows:—

Year—Variety	Outside Windbreaks	Inside Windbreaks	Per Cent Increase
	Yield per acre	Yield per acre	Yield per acre
	Bush.	Bush.	Bush.
1920 Gold Coin	166	479	190
1920 Everitt	121	413	241
1921 Gold Coin	249	761	204
1921 Everitt	156	576	269
1922 Wee MacGregor	159	299	88
1922 Irish Cobbler	150	298	98
1922 Gold Nugget	138	268	94
1922 Everitt	159	299	88
1922 Early Ohio	128	192	50

While the moisture from the melted snow plays an important part in increasing the crop yields, the lessening of evaporation and decrease in transpiration from the plants are undoubtedly influential factors in determining the crop returns.

FRUITS

TREE FRUITS

The season has been fairly favourable to the production of tree fruits. Cross-bred and crab apples produced more abundantly than ever before. Native plums fruited freely and for the first time, Compass and Rocky Mountain cherries bore fruit.

Apples.—Transcendent crab apple trees were well laden. Some trees were so heavily loaded that a number of branches required supports. Of the cross-bred varieties the Alberta, Elsa, Robin, and Jewel gave the heaviest crops. A second cross from *Pyrus baccata*, made between the Jewel and Tetofsky, produced fruit of fair size. The fruit from this tree, when made into preserves, was considered superior to preserves made from either the crab or Standard British Columbia or Eastern apples. Some of the first cross from the *Pyrus baccata* have made good quality preserves. No fruit has been obtained as yet from the Russian seedling apples.

Elsa—Cross-bred apple, Scott.

Plums and Cherries.—A number of Manitoba native plums, planted out as young seedlings in 1914, produced as much as 40 pounds of fruit on a number of trees. These plums are wonderfully hardy and up to the present have thrived well. Out of six Mammoth plums planted in 1918, one produced a small quantity of fruit this year. The plums were large but rather late in ripening. Five out of six Compass cherries, set out in 1920, fruited. They, too, were slow in ripening. Six Rocky Mountain cherries were planted in 1920; five of these grew and four bore fruit.

SMALL FRUITS

The dry season seriously decreased the crop on the strawberries and raspberries and lessened the yields from the currants and gooseberries.

Strawberries.—Both everbearing and summerbearing strawberry varieties were grown; the former produced a small quantity of fruit early in the season but produced practically none later. The Dakota variety gave the best returns again this year. The Alaska variety fruited but the crop was light. The fruit is sweeter than the Dakota but did not produce nearly as good a crop, although the plants appear quite hardy.

Raspberries.—While all varieties of raspberries suffered from the drought, it was found that canes that had been covered completely with soil during the previous winter produced three times the yield that the uncovered canes produced.

Currants.—Two plantations of currants are now producing fruit on this station. One lot was started in 1912 and the other in 1918. The older plantation has continued to give the better crops.

The drought appeared to affect the black currants more than it did the red sorts. The latter bore better in 1922 than in 1921, while the reverse is true of the black varieties. The selections of black currants made by the Central Experimental Farm continue to give much heavier returns than the kinds now listed by nursery firms. Kerry, Climax, Magnus, Topsy, Eagle and Saunders are promising sorts that should be multiplied. Red Grape gave the best yield of any of the red sorts, since it topped the list in the old plantation and was second highest in the new. Raby Castle, a variety advertised in nearly every commercial nursery catalogue, gave the second heaviest crop of red currants. Red Cross was the highest yielding sort of the younger lots. Large White out yielded the other two white kinds.

Gooseberries.—In the year 1920 eight varieties of gooseberries were received from the Central Experimental Farm. These were planted in the orchard where they are protected by the system of caragana hedges. A few of the bushes fruited last year, and this year all bore a light crop. The three heaviest producing varieties were Duncan, Charles, and Deacon.

TREES AND SHRUBS

The arboretum on the station was partly planted in 1912, and while some of the material planted proved insufficiently hardy, other kinds have withstood the severe weather conditions and have become well established. The growth of all kinds has been slow, partly due to a period of dry seasons and in part to the walks in the arboretum being down to grass instead of having been kept cultivated. Originally the cultivated strip in which each row of trees was planted was only four feet wide; more recently these strips have been widened until they are now about eight feet wide.

For the most part, the trees in the plantations on the farm are limited to the kinds listed in the following table. Jack pine, which is often used in windbreaks and farm plantations, has not proven so dependable as the other evergreens. The rate of growth as given in the table is not listed as a standard as it is only the rate of growth on one specimen of each kind. The trees were, however, grown under comparable conditions and, in a general way, represent the comparative rates of growth under conditions such as exist at this station.

RECORD OF HEIGHT OF SOME TREES IN ARBORETUM AT SCOTT—YEARS 1913 TO 1922

Variety	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Evergreen Trees—										
Native white spruce	2 ..	2 4	2 7	2 11	4 5	4 8	5 8	7 ..	8 ..	9 ..
Balsam fir	1 ..	1 6	2 2	3 3	3 6	3 10	3 10	4 8	6 6	7 6
Lodge Pole pine	– 10	1 7	2 6	3 9	4 10	5 3	6 3	7 8	8 9	10 6
Blue spruce	1 6	1 10	2 4	2 6	3 8	4 ..	4 ..	3 11	4 2	4 10
Deciduous Trees—										
Manitoba maple	4 4	6 2	8 8	9 4	.. ..	11 6	12 3	14 .	15 .	16 ..
Elm	4 2	3 ..	4 6	5 6	6 4	6 ..	6 2	5 10	6 5	7 6
Russian poplar	3 ..	4 5	8 4	9 8	10 7	11 ..	11 4	15 ..	17 ..	18 6
Green ash	.. 6	1 8	4 2	4 11	5 4	5 5	5 8	7 ..	7 10	8 6
Willow	3 8	4 10	6 6	7 3	7 11	8 ..	8 7	9 8	10 ..	10 8

CARAGANA

Nine species and varieties of Caragana are under test on the station. In view of the interest taken in this shrub, it has been thought advisable to include in this report a list of the names of the varieties, the heights they have attained and the period of bloom for this past season.

Variety	Height		Time of blooming
	Feet	In.	
Caragana arborescens	12	–	June 1 to 13
" " *pendula*	6	–	" 2 to 23
" *grandiflora*	5	4	" 3 to 14
" *frutescens*	4	7	" 1 to 13
" *microphylla*	5	–	" 3 to 13
" *mollis glabra*	6	3	" 3 to 15
" *pygmaea*	3	–	" 6 to 16
" " *aurantiaca*	4	–	" 6 to 19
" *tragacanthoides*	5	3	" 5 to 17

The *Caragana arborescens* is the one commonly used for hedge purposes where protection from the wind is necessary. A single row of this variety will, in a few years, if left untrimmed, afford considerable protection from the strong winds that prevail at certain seasons of the year on the prairies.

The *Caragana frutescens* is not nearly as tall growing as the former variety; it suckers freely and flowers more profusely. For a lower-growing hedge it is fairly satisfactory.

The *Caragana pygmœa* is a dwarf type of the *caragana*. It is quite ornamental at any time but is particularly handsome when in flower.

LILACS

Fifteen varieties of *Syringa vulgaris* flowered in the arboretum this season. In addition to these, four other kinds produced flowers.

Variety	Height		Season of bloom
	Ft.	In.	
Syringa vulgaris—Charles X	4	4	June 6 to 16
" " Congo	5	2	" 2 to 16
" " Doyen Keteleer	5	–	" 3 to 19
" " Georges Bellair	3	6	" 6 to 17
" " Grand Duc Constantine	5	8	" 4 to 19
" " La Tour d'Auvergne	5	4	" 3 to 17
" " Linne	6	–	" 1 to 17
" " Leon Simon	5	4	" 3 to 19
" " alba grandiflora	5	4	" 2 to 16
" " Marie Legraye	5	4	" 2 to 16
" " Michel Buchner	5	2	" 3 to 16
" " President Carnot	4	–	" 3 to 17
" " Pierre Joigneaux	5	2	" 2 to 15
" " Souvenir de L Spath	4	–	" 3 to 19
" " Bulgarian Lilac	5	–	" 3 to 16
Syringa amurensis	8	2	" 27 to July 5
" *chinensis*	5	4	" 5 to June 19
" *Josikaea*	6	–	" 17 to July 2
" *villosa*	8	6	" 13 to July 2

The Congo variety is outstanding because of its exceptionally large flower clusters. The variety *S. alba grandiflora* has been one of the freest blooming varieties grown on this Station. The large, white clusters of its flowers add much to the appearance of the arboretum during the lilac season. The *villosa* form of the lilac has thrived well here, the flowers are rather small and not nearly as strong-scented as the common lilacs.

Lonicera Tartarica Scott. Bush Honeysuckle.

Other Flowering Shrubs.—The tartarian honeysuckle has usually bloomed freely. The cherries produced an abundance of flowers, both the *Prunus Grayana* and the *Prunus Maacki* were in flower by May 25. For the first

season the *Spirea Van Houttei* flowered well here, hitherto it has suffered too severely from winter killing to produce more than a few flowers on each shrub. The Missouri currant *Ribis aureum,* produced a good crop of fruit. The yellow, sweet-scented flowers, together with the showy appearance of the large, black fruit, make this a desirable shrub for ornamental purposes. In addition, the fruit is edible and makes excellent pies.

FLOWERS

The past season being unusually dry, it afforded an opportunity to observe the most drought-resistant kinds. Notes taken during the summer show the following perennials to have grown well and flowered freely:—

Achillea (The Pearl).
Aquilegia (Columbine).
Chrysanthemum Leucanthemum (Ox-eye Daisy).
Delphinium (Perennial Larkspur).
Gypsophila paniculata (Baby's breath).
Hemerocallis (Day Lily).
Helenium Hoopsii (Sneeze Weed).
Lychnis chalcedonica (Jerusalem Cross).
Papaver nudicaule (Iceland Poppy).
Papaver orientale (Oriental Poppy).
Veronica incana (Speedwell).

Pæonies.—Pæonies have always flowered well here and great interest is taken by visitors in these hardy perennials. They continue to bloom each year and require no other attention than that of keeping the soil free from grass or weeds and cutting off the dead leaves and stems once a year. The following is a list of the pæonies under test at this Station with some of the notes taken during the past year.

PÆONIES—TEST OF VARIETIES

Variety	Height		Season of blooming
	Ft.	In.	
Charlemagne	2	6	June 29 to July 8
Couronne D'Or	2	8	July 4 to " 19
Duchesse de Nemours	2	10	June 29 to " 8
Festiva Maxima	3	–	" 21 to " 12
Felix Crousse	2	6	July 4 to " 19
La Tulipe	2	9	June 28 to " 10
Livingstone	2	4	July 4 to " 16
Mme. Auguste Dessert	2	4	June 26 to " 8
Mme. Calot	2	5	" 29 to " 17
Mme. de Verneville	2	8	" 21 to " 11
Mme. D'Hour	2	10	July 4 to " 15
Octavie Demay	2	2	June 24 to " 10
Philomèle	2	2	July 1 to " 11
Victor Lemoine	2	6	" 1 to " 11

Annual Flowers.—Annual flowers, once started, grow well on the prairies. The long days of bright sunshine bring them along very rapidly. Packets of flower seeds were sent out to a number of the wives of soldier settlers. These collections included both annual and perennial flower seeds. Reports received from the Director of the Home Branch of the Soldier Settlement board are most encouraging, quite a number of the women having had a good showing notwithstanding the dry summer.

A number of the annual flowers were found to show greater drought resistance than the others. The following list was compiled with the assistance of the Dominion Horticulturist:—

Antirrhinum (Snapdragon).
Browallia (Amethyst Plant).
Centaurea moschata (Sweet Sultan).
Eschscholtzia (California Poppy).
Helianthus (Sunflower).
Lavatera trimestris.
Linaria (Toad Flax).
Lobelia Erinus.
Papaver Rhoeas (Sherley Poppy).
Petunia Violacea hybrida.
Salpiglossis (Painted Tube Tongue).
Schizanthus (Butterfly Flower).

Asters.—One of the most popular of the annual flowers both for making a showing in the gardens and for use as cut flowers is the aster. It has one objection for this district in that it has to be started in the hotbeds in order to ensure a lengthy season of bloom before the severe frosts come. Each season at Scott the flower beds in the late summer are well supplied with this handsome flower. This year some thirty-two varieties were grown. The following table gives some of the notes taken during the season. The seed was sown in the hotbeds on April 12 and transplanted to the gardens June 17 to 19th:—

ASTERS

Variety	Seedsman	Height	Season of Bloom
		In.	
American Beauty	Sutton	25	Aug. 18 to Oct. 11
Dark Violet E.B.	Vick	21	July 22 to Sept. 12
Lavender Pink King	"	20	Aug. 15 to " 25
"	"	22	" 4 to " 10
Late Upright Rose	"	23	" 7 to " 7
Meteor	Sutton	6	July 7 to Aug. 26
Peach Blossom	Vick	21	Aug. 15 to Sept. 25
Purple	"	22	" 4 to " 10
Rosy Carmine	"	20	Aug. 21 to Oct. 11
Rochester Shell Pink	"	20	" 10 to Sept. 16
" White	"	16	" 9 to " 17
Semple's Pink	"	21	" 19 to " 15
Snow Queen	Sutton	9	July 28 to Aug. 17
Silvery Rose	Vick	20	Aug. 10 to Sept. 77
Violet King	"	19	" 7 to " 11

CEREALS

The summer of 1922 was one of the driest on record at this Station. The total precipitation for June was .87, for July .26 and for August 3.04 inches. Fields and plots that early in the season gave promise of excellent yields, produced less than half an average crop, due almost entirely to lack of rainfall. It is marvellous that the crop came through as well as it did, considering the low precipitation for June and July, which are the two principal growing months for this district. The August rains were beneficial since they helped filling, but came too late materially to increase the yields.

WHEAT—VARIETY TESTS, 1922

Eleven named varieties of spring wheat were tested in duplicate on one-fortieth-acre plots. The land was summer-fallowed in 1921. The soil is a chocolate clay loam. The seed was sown on April 24 at the rate of 1½ bushels per acre.

Early Red Fife continues to yield well but cannot be recommended for this district owing to the winds that prevail in the harvest season and to the shattering habit of this variety. Garnet has been grown at Scott for four years, formerly under a number. During this time it has out-yielded Ruby and has matured, on an average, two days earlier. It is nine days earlier than the Marquis. Duchess is another early variety originated by the late Dominion Cerealist. It did not do well at this Station this year. Kubanka, the only Durum variety tested, gave poor returns.

SPRING WHEAT—TEST OF VARIETIES

Variety	Date of ripening	Number of days required to mature	Average length of straw, including head	Average strength of straw. Scale of 10 points	Yield of grain per acre	Yield of grain per acre	
		Days	In.		Lbs.	Bush.	Lbs.
Early Red Fife..Ottawa 16	Aug. 19	117	31·5	10·0	1,044	17	24
Red Fife..... " 17	" 20	118	33·5	10·0	1,044	17	24
Kitchener.....	" 18	116	30·0	10·0	1,028	17	8
Red Bobs.....	" 16	114	29·0	10·0	1,018	16	58
Marquis.....Ottawa 15	" 18	116	29·5	10·0	902	15	2
Garnet..... " 652	" 15	113	25·0	10·0	882	14	42
Pioneer..... " 195	" 14	112	29·0	9·5	864	14	24
Ruby..... " 623	" 14	112	30·0	10·0	856	14	16
Kubanka.....	" 23	121	35·5	10·0	734	12	14
Duchess.....Ottawa 933	" 11	109	22·0	9·0	584	9	44
Kinley.....	" 20	118	32·0	10·0	1,148	19	8

The variety Kinley was received from a farmer from that district. Only sufficient seed was secured for one test while all other variety yields represent the average returns from two tests. In the baking tests made by the University of Saskatoon, the Kinley was condemned as an unsuitable wheat for flour.

SPRING WHEAT—AVERAGE YIELDS

Variety	Three-year Average		Five-year average		Ten-year average	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Kitchener.....	28	17	20	33	–	–
Early Red Fife.....Ottawa 16	26	8	–	–	–	–
Red Fife..... " 17	27	18	19	35	26	47
Red Bobs.....	25	27	18	34		
Marquis.....Ottawa 15	24	56	18	16	26	28
Pioneer..... " 195	22	11	16	11	–	–
Garnet..... " 652	20	49	–	–	–	–
Ruby..... " 623	19	10	13	7	–	–

From the above it will be noted that Kitchener has consistently kept at the top of the list during the time it has been grown at this Station. The seasons have been dry, consequently it is impossible to forecast how the Kitchener will yield in moist years. Marquis has during the past three years yielded approximately 2½ bushels per acre less than Red Fife, but has, during a ten year period, yielded slightly more. The Kitchener has not as pleasing an appearance in the field as the Red Fife or Marquis. The seed-bearing stalks are uneven in length which gives a ragged appearance to the crop.

OATS

Fourteen varieties of oats were sown on April 27. Duplicate tests were made of all varieties. Two bushels of seed per acre was used excepting for the hulless variety "Liberty." This variety was sown at the rate of one bushel per acre.

OATS—TEST OF VARIETIES, 1922

Variety	Date of ripening	Number of days required to mature	Average length of straw, including head	Average strength of straw, scale of 10 points	Yield of grain per acre	Yield of grain per acre
		Days	In.		Lbs.	Bush. Lbs.
Gold Rain	Aug. 14	109	34·5	9·5	1,800	52 32
Victory	" 14	109	34·25	8·75	1,752	51 18
Banner.....Ottawa 49	" 14	109	33·75	9·0	1,580	46 16
Gerlach	" 14	109	32·5	9·0	1,568	46 4
Great Russian	" 14	109	32·75	9·0	1,546	45 16
Tartar King	" 14	109	35·0	9·0	1,500	44 4
Russian Yellow	" 14	109	33·0	9·0	1,470	43 8
Leader	" 14	109	33·75	8·75	1,448	42 20
Columbian....Ottawa 78	" 14	109	33·0	9·0	1,430	42 2
Daubeney..... " 47	" 9	104	30·5	8·75	1,344	39 18
Longfellow..... " 478	" 14	109	34·75	8·80	1,302	38 10
Prolific..... " 77	" 14	109	34·5	9·0	1,254	36 30
Liberty..... " 480	" 10	105	33·5	8·5	1,220	35 30
Alaska	" 9	104	33·5	9·0	1,028	30 8

The list of varieties of oats this year includes five sorts not previously grown at this Station. The Gerlach was received from the Agricultural College at Saskatoon. The Great Russian from A. Dowling at Luseland, and the Columbian, Longfellow and Prolific were sent to the Station by the Cereal Division at the Central Farm. The particulars regarding these latter oats are given in the late Dominion Cerealist's report for the year 1921 and are as follows:

"Columbian, Ottawa 78. This is a pure-line selection from an old commercial sort called American Beauty. It is very productive and has a branching panicle.

"Longfellow, Ottawa 478.—This belongs to the popular class of so-called "sided" oats. It comes from a cross between Tartar King and Banner. Though not remarkably productive, the exceptional length and strength of the straw of this variety may render it valuable in some districts.

"Prolific, Ottawa 77.—A pure line selection from a variety obtained from France in 1903 under the name of Abundance. As this name is now commonly used in Canada for a different variety it was thought best to introduce this new selection under another name so as to avoid confusion. Prolific is, as its name indicates, a very productive oat. It has stiff straw and a branching panicle."

One point that has been particularly pronounced in the tests of oats is that early maturing varieties produce considerably less yields than the medium or later maturing sorts.

OATS—AVERAGE YIELDS

Variety	Average yield per acre, three years	Average yield per acre, eight years
	Bush. Lbs.	Bush. Lbs.
Banner—Ottawa 49	62 3	66 33
Victory	60 20	66 30
Gold Rain	59 10	65 4
Russian Yellow	55 16	– –
Leader	53 4	– –
Tartar King	46 17	57 17
Daubeney—Ottawa 47	46 31	51 3

The three leading varieties of oats continue to keep their places at the top of the list. The Banner has, during the three years, given an average of over eight bushels per acre more than Leader, a variety that has been widely advertised in the west. This difference in yield is quite a consideration from the producer's standpoint. Russian Yellow has been advertised for some seasons as a suitable sort but is almost six bushels under Banner in returns per acre.

BARLEY

The season was much too dry for even fair yields of barley. The tests of varieties were made on well-worked summerfallow, the plots were sown on May 5 and duplicate tests made. Since a considerable number of varieties have been tested for a period of only two years, in addition to some particulars from the 1922 crop the average yields for the last two seasons are included in the following table:—

BARLEY—TEST OF VARIETIES

Variety	Number of days required to mature	Average length of straw including head	Average strength of straw, scale of ten points	Yield of grain per acre	Yield of grain per acre		Average yield per acre, two years	
	Days	Inches		Lbs.	Bush.	Lbs.	Bush.	Lbs.
Himalayan (hulless) Ottawa 59	89	22·5	8·25	1,083	22	27	28	37
Hannchen	105	28·0	10·0	1,024	21	16	.....	
Gold	104	19·0	10·0	994	20	34	28	03
Barks C.P.R.	109	24·0	10·0	874	18	10	31	46
Barks Excelsior	109	24·0	10·0	720	15	–	.....	
Duckbill Ottawa 57	111	23·0	10·0	700	14	28	24	18
O.A.C. 21	108	24·25	10·0	658	13	34	27	33
Chinese Ottawa 60	108	24·5	10·0	610	12	34	27	16
Albert Ottawa 54	89	21·75	9·0	564	11	36	15	22
Gordon A	105	26·5	10·0	530	11	2	20	10
Stella Ottawa 58	108	22·25	10·0	514	10	34	25	37

PEAS

Six varieties of peas were tested. They were sown on land that had been summer-fallowed the previous year. Duplicate tests were made. The peas were all sown on May 4 and pulled for threshing September 1.

PEAS—TEST OF VARIETIES, 1922

Variety	Date of ripening	Number of days required to mature	Length of vine	Yield per acre	Yield per acre	
		Days	Inches	Lbs.	Bush.	Lbs.
Prussian Blue	Sept. 1	120	24	1,128	18	48
Arthur Ottawa 18	Aug. 19	107	20	888	14	48
Chancellor Ottawa 26	" 17	105	20	858	14	18
Early White	" 17	105	22	844	14	4
Solo	" 26	114	21	654	10	54
Wright's	.....	.....	20	488	8	8

Prussian Blue peas have again given the heaviest yield, outyielding the Arthur, the next heaviest yielding sort, by 4 bushels per acre.

FLAX

Three varieties of flax were sown in the uniform test plotes on May 25 and were harvested on September 12. The following table gives the average yields of the three varieties for the past season and the comparative yields from the two sorts, Novelty and Premost, that have been under trial at this Station during the past six years:—

FLAX—TEST OF VARIETIES

Variety	Length of straw	Yield per acre, 1922		Average yield per acre, six years	
	Inches	Bush.	Lbs.	Bush.	Lbs.
Novelty Ottawa 53	18	10	10	8	42
Crown	18	9	26		
Premost	18	8	22	8	22

SPRING RYE

Only two varieties of spring rye were grown. These were sown in duplicate on May 4 and harvested on August 21.

SPRING RYE—TEST OF VARIETIES

Variety	Date of ripening	Number of days required to mature	Average length of straw including head	Average strength of straw scale of ten points	Yield of grain per acre	Yield of grain per acre	
		Days	Inches		Lbs.	Bush.	Lbs.
Prolific	Aug. 21	109	37	10	1,148	20	28
Select Ottawa 12	" 21	109	35	10	878	15	38

WINTER RYE

Winter rye has always been a difficult crop to handle at this Station. In two seasons winter-killing has destroyed the crop completely. In two other years the crop was about half a stand, and in two other seasons fair crops were obtained.

During the first years, varieties commonly grown in Eastern Canada and British Columbia were used, but these proved too tender. Later, the North Dakota 959, now called in this province Dakold, was introduced and appeared more hardy. Last season it was sown on the uniform test plots and, in addition, seed of the Rosen and Vasa varietics were obtained. Duplicate tests were used for these three varieties and, in addition, one-half of each plot was covered with straw in order to determine the advisability of this practice and also to secure, if possible, comparative yields free from the influence of winter losses.

The plots were sown on August 15, 1921. The seed germinated well and it was particularly noticeable that the Vasa and Rosen varieties made a much stronger growth in the fall than the Dakold. The straw that covered one-half of each plot was applied on November 16 and 17 and was removed about May 15 The crop was not pastured at any time but in the spring it was found that,

while the uncovered portion of the Dakold appeared to come through in good shape, the Vasa and Rosen varieties were completely winter-killed except where a mulch was used. The Vasa, even where covered with straw, showed some winter losses.

WINTER RYE

Variety	Wintered, using straw mulch Yield	Wintered, no mulch Yield
	Lbs.	Lbs.
Dakold	1,760	1,040
Vasa	1,520	Winter killed
Rosen	1,540	"

FALL WHEAT

A small quantity of the variety Kharkov was obtained from the Noble Foundation Co. This was sown in rows and made only a fair growth in the autumn. Part of the area was covered with straw and part left untouched. Winter-killing thinned the crop down so that no records of yields were possible. Another lot of the same variety was sown this year and made a good start.

SEED GRAIN

Multiplication of the best varieties of grain has been continued where possible. The season being very dry the yields were light, but sufficient good seed was obtained to sow the fields on the Station and to permit selling some for spring of 1923.

Variety	Date of sowing	Number of days required to mature	Area	Total yield	Total yield per acre
		Days	Acres	Bushels	Bushels
Banner Oats Ottawa 49	April 29	108	9·08	355	39·1
Liberty Oats Ottawa 480	May 18	95	2·9	56	19·3
Marquis Wheat Ottawa 15	April 27	107	20·0	325	16·2

SEED SOLD

In addition to the seed used on the Station during the year 1922 the following quantities of seed were supplied to farmers either through the Illustration Stations or direct to the farmers themselves. Registered Banner (Ottawa, 49) 310 bushels. Registered Marquis (Ottawa, 15) 235 bushels. Liberty (the hulless oat) 2½ bushels and Prolific spring rye, 21 bushels. Twenty-two farmers received the Banner oats; twenty farmers Marquis wheat; five purchased Liberty oats and two Prolific spring rye.

FORAGE PLANTS

ENSILAGE CROPS

INDIAN CORN

Eighteen varieties and strains of field corn were planted this season in uniform duplicate test rows. The seed was sown on May 22 on summer-fallowed land and the crop harvested on September 8. The yields of green fodder per acre are herewith reported in tabular form:—

CORN FOR ENSILAGE—TEST OF VARIETIES

—	Height of plants	Stage of maturity	Yield per acre green weight	
	Inches		Tons	Lbs.
Longfellow	59	Early silk	5	292
Golden Glow	58	"	5	69
Comptons Early	56	Early tassel	3	1,594
Northwestern Dent (Steel Briggs)	45	" silk	3	1,274
Dakota White Flint	40	" "	3	1,228
North Dakota	50	" tassell	3	1,137
Northwestern Dent	48	" silk	3	999
White Cap Yellow Dent	54	" "	3	925
Northwestern Dent (Dakota Improved Seed Co.)	43	" "	3	730
Mandan King (Wills)	43	" "	3	679
Wisconsin No. 7 (Sample No. 2)	48	Early tassel	3	587
Improved Leaming (Sample No. 1)	57	" "	3	267
Disco Yellow Flint	36	" "	3	77
Bailey	53	" "	2	1,947
Wisconsin No. 7 (Sample No. 1)	48	" "	2	1,856
Minnesota No. 13 (Wills)	42	" silk	2	1,764
Disco 90-day White Dent	43	" tassel	2	1,696
Improved Leaming (Sample No. 3)	54	" silk	2	1,306
Disco Pride Yellow Dent	42	" "	2	803
Improved Leaming (Sample No. 2)	54	" tassel	2	666

Three of these varieties have been grown for four consecutive years. The average yields of green fodder per acre are as follows:—

	Average stage of maturity	Yield per acre, four-year average	
		Tons	Lbs.
Comptons Early	Early tassel	7	714
Longfellow	Tassel	7	71
Northwestern Dent	Early silk	6	72

It is a fact worthy of note that the average yield of these varieties has varied inversely with the stage of maturity, but since the value of ensilage corn depends to a large extent on its stage of maturity, it would seem a better policy to grow earlier maturing varieties, even at the expense of slightly decreased yields.

Comptons Early is a leafy, succulent variety and has consistently given the highest total yield. Northwestern Dent has yielded somewhat less, but on account of its earliness, is more suitable to this district. Longfellow has been intermediate between these varieties, both in earliness and yield.

SUNFLOWERS

Sunflowers are a more promising ensilage crop for this district than corn. They are very resistant to spring frosts and are comparatively drought resistant. The yield of fodder per acre is usually higher than that of corn and considerably higher when early seeding is practised. They also appear to withstand more frost in the fall and hence may be harvested later. In periods of drought the sunflowers appear to be able to extract more moisture from the soil than other intertilled crops and quickly respond to more favourable moisture conditions. In view of these facts, a paying crop may be expected in any normal year, providing suitable soil and cultural methods are used.

Seven "varieties" of sunflowers were sown this season. The seed was planted on May 22 in rows three and one-half feet apart and harvested on September 13. The land used was chocolate loam, well summerfallowed, in 1921. Unfortunately, the rabbits destroyed a considerable percentage of the plants in the spring and hence comparative yields are not available. Notes were taken, however, on the remaining stand at intervals during the season.

SUNFLOWERS—TEST OF VARIETIES

	Source of seed	Height in inches	Stage of maturity on Sept. 13
Mammoth Russian Early Ottawa	Central Experimental Farm, Ottawa.	68	Early flowering.
Giant Mammoth Russian	Dakota Imp. Seed Co	68	"
Giant Mammoth Russian	McDonald	66	"
Brooks Dwarf	Alberta	55	Late flowering.
Manteca	Alberta	60	" "
Prolific White	Alberta	63	Early "
Ottawa 76	Central Experimental Farm, Ottawa.	60	Late "
Mixed Mennonite	Rosthern, Sask	56	Seeds ripe.

The Giant Mammoth Russian variety appears to be much superior to the other varieties tested. Its comparative lateness may be overcome by earlier seeding. Grown under field conditions it has usually reached about 10 to 15 per cent in bloom and has made excellent ensilage.

Early Ottawa 76 appears to be a promising variety, combining earliness with a fair yield.

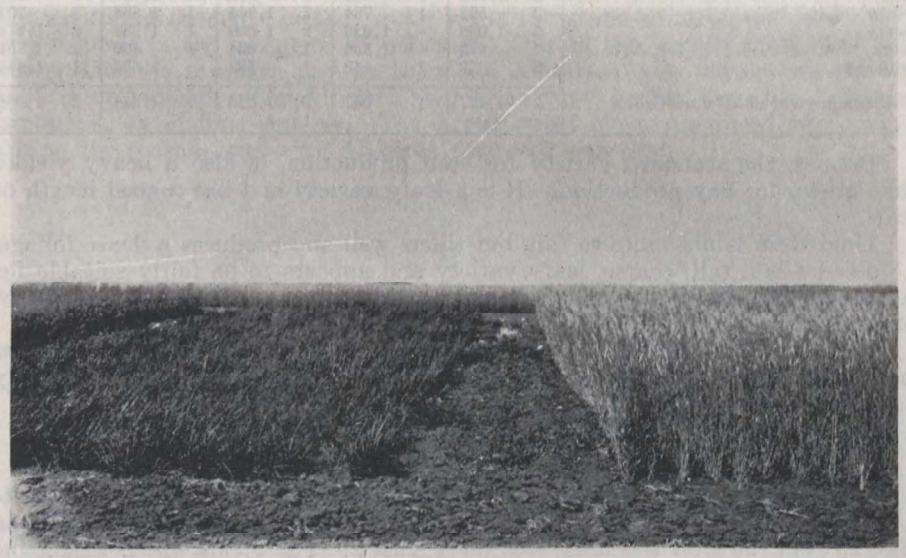
Mixed Mennonite sunflowers are the earliest of the varieties tested. Earliness and heavy yield do not usually go together and hence the total yield is in proportion to the lateness of maturity.

ANNUAL HAY CROPS

Crops suitable for the production of hay the same season as sown, have been grown in duplicate, uniform test plots since 1916. Some varieties have been dropped, as they were not considered suitable for this purpose, and others have been included in the test. This year only four crops were used but several varieties of each crop were included. The yields of these varieties are given in separate tables. In each case summer-fallowed land was used. The results expressed in tons of cured hay per acre are as follows:—

Variety	Date sown	Date cut	Yield of crops per acre			
			1922		Seven-year average	
			Tons	Lbs.	Tons	Lbs.
Oats and Peas	May 25	Aug. 2	1	1,340	2	909
Spring Rye	" 25	" 2	1	1,010	2	129
Japanese Millet	" 25	" 2	1	120	1	1,971

A six-year average shows that oats alone have yielded only slightly less than a mixture of oats and peas. This year's results with oats are not comparable and hence are not included in the above table. While a mixture of oats and peas is more palatable than oats alone, the cost of seed in the past few years has been too high, and the peas have constituted only a very small part of the mixture.



Spring rye and millet sown same day. Note rye is ready for cutting for hay.

The yield of spring rye has compared very favourably with that of oats, or a mixture of oats and peas, but the spring rye is decidedly less palatable. It appears to be more woody and is certainly less leafy. Spring rye, however, will make hay in a shorter time than oats and may be sown later with expectations of a reasonable yield, both of which are factors of considerable importance in districts with limited rainfall.

Millets respond quickly to favourable moisture conditions but do not produce profitable returns in dry or cool seasons.

Sudan grass has twice been included in the tests, and in neither case has it proved itself to be adapted to climatic conditions here. It is a tropical plant and hence frost-tender.

OATS FOR FODDER PRODUCTION

Since oats have been found to be the most suitable of the crops tested for fodder production, it was considered advisable to test out several varieties under uniform conditions with the object of ascertaining their suitability for this purpose. Seven varieties of oats were sown on May 23 in duplicate uniform test plots. Each plot was further sub-divided into three equal parts and cut at three different stages, viz, in bloom, when turning, and when ripe. The first cutting, only, produced an aftermath. The yields of the varieties cut at the various stages of maturity were as follows:—

OATS FOR HAY—TEST OF VARIETIES

Variety	Yield of hay per acre, weighted at cutting time									
	In bloom		Aftermath		When turning		Ripe		Average yield per acre	
	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
Gold Rain	3	592	1	1,264	3	1,072	2	192	3	1,040
Banner	3	272	2	544	2	1,632	2	16	3	821
Leader	2	1,120	2	288	3	528	1	1,136	3	557
Victory	3	592	1	784	2	1,344	1	1,888	3	203
Liberty	2	1,056	–	1,632	2	1,600	1	1,232	2	1,173
Alaska	2	672	–	1,856	1	624	1	400	1	1,851
Daubeney	2	32	1	48	1	592	–	1,664	1	1,445
Average yield of all varieties	2	1,477	1	917	2	1,056	1	1,218	2	1,584

Banner, the standard variety for seed production, is also a heavy yielder when grown for hay production. It is a leafy variety and has a good length of straw.

Gold Rain is not quite so tall, but tillers well and produces a dense foliage.

Leader is a tall, coarse, leafy variety and appears to be fairly suitable for hay production, but is not equal to our standard varieties, Banner and Victory, for production of seed.

Daubeney and Alaska are early maturing varieties, having narrow leaves and slender stems, and hence are light yielders. These varieties are probably more suitable as a nurse crop than as an annual hay crop.

PEAS FOR HAY

Five varieties of peas were sown this year in order to test out their suitability for hay production. The seed was sown on summer-fallowed land on May 25, and the crop was harvested on August 2. The yields, green weight per acre, were as follows:—

Variety	Yield per acre
	Lbs.
Chancellor	1,520
Arthur	1,500
Early White	1,460
Prussian Blue	1,320
Solo	1,314

The yields reported are unusually low, due to the prolonged drought throughout the growing season. In a more favourable season, the late maturing varieties, Prussian Blue and Solo, will undoubtedly show up to better advantage.

SWEET CLOVER

Two varieties of biennial sweet clover were sown on June 16, 1921, under field conditions. A plot of Hubam (annual sweet clover) was sown on May 27, 1922. In all cases the seed was sown without a nurse crop on well prepared summer-fallow land, that would be comparable from the standpoint of fertility, topography, etc. The yields of cured hay per acre in 1922 were as follows:—

SWEET CLOVER—VARIETY TESTS.

Variety	Date of cutting	Yield of cured hay per acre	
		Tons	Lbs.
Arctic (white blossom)	June 20, 1922	1	939
Albotrea (yellow blossom)	" 20, 1922	..	1,054
Hubam (white blossom)	Sept. 1, 1922	1	280

The Arctic sweet clover produced a heavier growth during the seeding down season than did the yellow-blossomed Albotrea. Both varieties of biennial sweet clover were pastured quite closely, by a flock of sheep, in the fall of 1921; no winter-killing occurred in the Arctic while the stand of Albotrea sweet clover was thinned to the extent of 25 per cent. During this season the Arctic sweet clover made a stronger growth than the Albotrea; the latter variety was slightly decumbent. The Albotrea variety matures earlier than the Arctic and produces hay of finer quality. The Arctic sweet clover produced two cuttings during the season, while the Albotrea produced only one.

Hubam Sweet Clover ready for cutting for hay, 1922. Yield per acre 1 ton 280 lbs.

The Arctic appears to be the most suitable of the biennial sweet clover varieties, being perfectly winter hardy. Excellent catches may be obtained by seeding down in the spring with a nurse crop, providing a fairly thin seeding of the nurse crop is practised.

Preliminary trials having proved that sweet clover can be successfully grown with a nurse crop, it became necessary to determine the best kind of nurse

crop to use and the best rate of seeding of such nurse crop. With this object in view, an experiment was started in 1920. Oats and barley were used, the rate of seeding varying from one-half bushel to two bushels per acre, while the amount of sweet clover seed was constant. A new set of plots are sown each year, the yields reported being those of the second year's growth of the clover. The yields from the range sown in 1921, and harvested in 1922, are reported below in tabular form:—

RATES OF SEEDING NURSE CROP AND KIND OF NURSE CROP

Nurse crop used in 1921	Yield of cured hay per acre			
	1922		Two-year average	
	Tons	Lbs.	Tons	Lbs.
Oats, ½ bushel per acre	1	1,840		
Oats, ¾ "	1	1,700	1	1,450
Oats, 1 "	1	1,980		
Oats, 1½ "	1	1,560	1	860
Oats, 2 "	1	960	1	380
Barley, ½ bushel per acre	1	1,580		
Barley, ¾ "	1	1,440		
Barley, 1 "	1	1,360	1	240
*Barley, 1½ "	2	440		
*Barley, 2 "	2	320	1	1,660
Sweet clover sown alone	1	1,280	2	420

NOTE:—No explanation can at this time be offered as to why plots marked * produced heavier yields in 1922 than where lighter seedings of nurse crops had been used.

The thin seeding of the nurse crop uses less moisture and allows the clover plants to get the maximum amount of sunlight, resulting in a taller and more vigorous growth. Moreover, a moderately thin seeding of either oats or barley produces almost as good a crop as the thick seeding and acts as a nurse crop instead of a robber crop.

Sweet clover sown alone has produced a slightly higher average yield than when sown with nurse crop but the increased yield has not been sufficiently great to justify the loss of the grain crops. Since sweet clover is a biennial, seeding alone on summer-fallow land is not practical, and a crop can be much more economically grown by seeding down with a nurse crop, summer-fallowed land being preferable.

MIXTURES OF GRASSES AND CLOVER FOR HAY

Western rye grass and brome grass are by far the hardiest of the varieties of grasses tested out on this Station and appear to be well adapted to our conditions. Of the leguminous forage plants, the biennial white sweet clover appears to be outstanding in point of yield and hardiness. Growing grasses and legumes in a mixture not only increases variety and palatability, but helps to balance the ration. The various varieties of grasses and clovers vary greatly in their ability to take possession of the soil, or to hold their own when grown in competition with other plants, consequently, an experiment was started in 1921 to find out the proper proportion of seed of each of these varieties to use, when sown in a mixture. The yields in 1922 were as follows:—

RATES OF SEEDING GRASSES AND CLOVER IN A MIXTURE

Variety and rate of seeding	Yield of cured hay per acre, 1922	
	Tons	Lbs.
Western rye grass	1	720
Brome grass	1	400
Western rye grass, 8 lbs., sweet clover, 4 lbs.	1	1,440
" " 8 " " 6 "	1	1,560
" " 8 " " 8 "	2	600
" " 8 " " 10 "	2	880
" " 8 " " 12 "	3	160
" " 4 " " 8 "	2	240
" " 6 " " 8 "	2	320
" " 10 " " 8 "	1	1,840
Sweet clover, 12 lbs.	1	1,280
Brome, 8 lbs., sweet clover, 6 lbs.	2	880
" 8 " " 8 "	2	..
" 10 " " 10 "	1	1,880
" 7 " Western rye grass, 7 lbs.	2	280

In this experiment the total yield was increased when the rate of seeding sweet clover was increased from four pounds to twelve pounds per acre, the amount of western rye grass used being constant. In a general way it may be said that the sweet clover plants did not predominate in the resulting crop. The various mixtures of western rye and sweet clover have in each case yielded more than either crop sown alone.

While the heavier rate of seeding sweet clover increases the cost of seeding down, yet it is considered advisable in semi-arid districts: firstly, because it insures a heavier stand, secondly, a finer quality of hay is produced and thirdly its greater efficacy in controlling weeds.

COMPARATIVE TEST OF GRASSES

During the past ten years a number of grasses have been tested out on this Station. Out of eight varieties that are commonly grown in more humid climates, only two kinds, western rye and brome grass, have proven sufficiently hardy and drought resistant to warrant growing them in this district.

These two grasses have been grown side by side in the test plots during the past three years. The comparative yields of cured hay are given in tabular form below:—

COMPARATIVE YIELD PER ACRE 1920 TO 1922

Variety	Yield per acre, 1920 Sown 1919		Yield per acre, 1921				Yield per acre, 1922				Average yield	
			Sown 1919		Sown 1920		Sown 1920		Sown 1921			
	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
Western rye	2	400	2	1,320	2	..	1	1,200	1	720	1	1,928
Brome grass	1	..	2	1,560	2	200	1	400	1	400	1	1,312

One difficulty that has occurred has been that of securing brome grass seed that germinates readily. Good stands of rye grass have always been obtained, whereas in every season the stand of brome has been rather thin, due to part of the seed failing to produce plants. By the second cropping year the brome has always been well established, due to its ability to send up shoots from the root stalks.

VARIETIES OF WESTERN RYE GRASS

Western rye grass selections have been made by the Dominion Agrostologist from seed from a large number of wild forms, collected mainly in Western Canada. These were grown at the Central Experimental Farm and a number of the more promising varieties were sent to the branch Farms for testing for hay and seed production. Five lots of seed were received at Scott and these, with one commercial lot, were sown in rows in June, 1921. The seed was all sown by hand to secure an equal amount of seed on each plot.

WESTERN RYE GRASS—TEST OF VARIETIES

No. of Selection	Height of plants	Yield of cured hay per acre	Yield of threshed seed per acre
	Inches	Tons Lbs.	Lbs.
4	34	2 330	704
5	32	2 116	821
6	34	2 116	772
10	35	1 1,619	766
*11	34	2 169	790
*Commercial seed	36	2 465	699

NOTE.—It is probable that the last two varieties received some additional moisture from snow that drifted on the borders of these two plots during the winter.

In addition to the small quantities of seed received to sow the variety tests of western rye, a five-pound sample of strain No. 5 was received to test out for seed production. The seed was sown in rows with the grain drill. Cracked wheat was used to give bulk to the grass seed so that it would feed through the

Variety Tests Western Rye Grass—each seven rows different variety. Hay yields running over two tons per acre harvested from plots in foreground. Plots of grass showing yielded from seven to eight hundred pounds of seed per acre.

drill. Sufficient spouts were stopped up in the drill to have the grass seed in rows three feet apart. The five pounds of seed proved sufficient to seed 3·08 acres. During the past summer, 1,457 pounds of grass seed was threshed from this field, increasing the original quantity of 5 pounds 290 fold.

PASTURE EXPERIMENT

In continuing the pasture experiment outlined in the report for last year, it was found that the close pasturing of the previous season had caused the alfalfa to winter-kill too badly to be included this year. The other pasture crops available for this year were western rye grass, fall rye and sweet clover.

The fall rye was seeded about September 1. The seed used was the hardy variety known as Dakold (formerly North Dakota 959). This made a good fall growth which no doubt served as considerable winter protection.

The estimated winter-killing was 5 per cent. This would probably have been greater had the crop been pastured in the fall. This crop usually heads late in June or early July and very little growth is made after this date, even though the pasturing prevents the heading out.

The sweet clover was seeded in rows one foot apart in the previous spring (1921) and allowed to grow untouched until October when it was pastured quite closely by the range flock. The area was not fenced, hence no records are available as to the exact amount of pasture removed, but the crop stood about two feet in height at that time. In the spring of 1922, fresh growth started from the crown and was ready for pasturing on May 20.

The western rye grass was the same plot that was used last year and showed the serious effect of the close pasturing of the previous season.

The following will show the value of each pasture per acre for the season:—

——	Fall rye	Sweet clover	Western rye
Number of days pasture for one sheep	540	787	310
Number of sheep each pasture will keep, per acre	3·6	5·2	2·0
Value of pasture at 25c. per month per head	$4.50	$6.50	$2.50

The sweet clover was outstanding again this year in quantity of pasture supplied. The amount removed during the fall of 1921, as mentioned above, is estimated to be about one-quarter the amount removed during this season. This estimate is not included in the above figures.

FIELD ROOTS

Tests with field roots during the past season have consisted in testing seed sold in this part of the province for purity, viability and productiveness. In addition, tests of different varieties of turnips, mangels and sugar beets have been made. Carrot seed of several of the most promising varieties was sown but did not germinate well, due to the very dry weather.

Yields generally from the field roots were lower than usual. The fall turnip yields were lower than the yields from the purple top sorts. This is contrary to the results from previous experiments and can be accounted for only by the peculiar weather conditions existing during the summer.

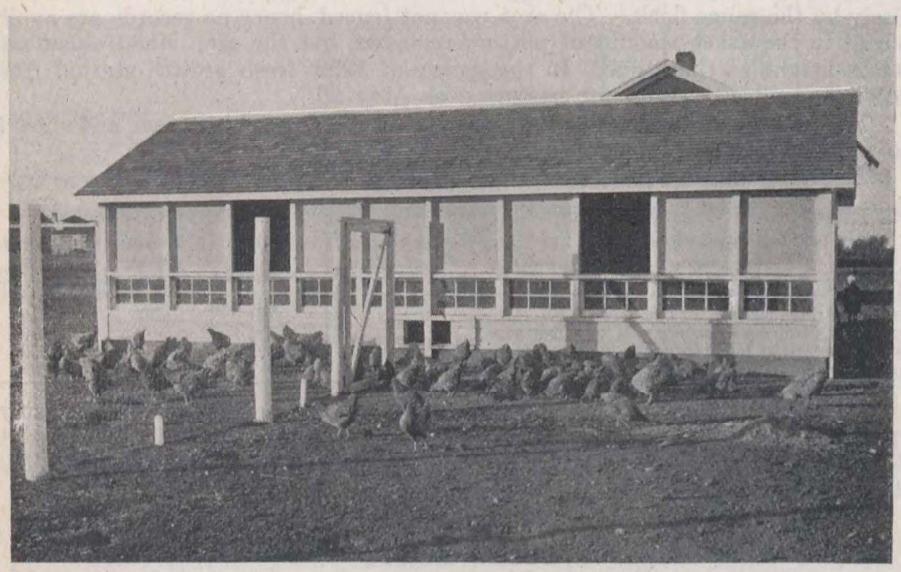
In the rutabaga varieties, Ditmars swede, McKenzie's North Western, and Steele Briggs Select Westbury, gave the best yields. In the fall turnips, three of Steele Briggs varieties, Red Top Strap Leaf, Greystone and Purple Top Mammoth, were highest in yield.

In the mangel tests, three of McKenzie's varieties were heaviest producers; these were Yellow Globe, Golden Tankard, and Eclipse. The yields from the six varieties of sugar beets were fairly uniform, all producing light crops. In all, sixty-one varieties and strains of field roots were tested. Duplicate tests were made to insure fair comparisons.

POULTRY

THE PLANT

The poultry plant consists of two permanent poultry houses, each 16 feet wide and 32 feet long, to accomodate 100 birds. These buildings have straw lofts which insure dry conditions in the winter and a cooler temperature in the summer. The front or south side of each house is about one third each of wood, glass and cotton. The first two feet above the foundation is one inch board, on top of this is a row of windows and above this is a row of cotton screens. In addition to these two permanent houses are six portable houses 12 feet by 16 feet. These are used to house the remainder of the stock, and during the brooding season may be utilized as brooder houses for the young chicks.



One hundred-bird poultry house, Scott.

THE STOCK

Barred Plymouth Rocks only are kept and the stock on hand November 1 were 180 pullets, 113 hens and 42 cockerels.

EXPERIMENTAL WORK

HENS VS. PULLETS FOR EGG PRODUCTION

Many of the flocks on the farms in Western Canada consist of altogether too high a percentage of old hens. The value of pullets for egg production has been clearly shown by the results of the experiment conducted on this and other Stations. The following table shows the comparative average production per bird per month for the past year at this Station:—

EGG PRODUCTION—HENS *vs.* PULLETS

Month	Hens—Eggs per bird per month	Pullets—Eggs per bird per month
November, 1921	2·0	3·3
December, 1921	1·7	6·0
January, 1922	2·1	9·5
February, 1922	1·4	5·6
March, 1922	7·7	12·0
April, 1922	11·49	14·0
May, 1922	12·7	15·2
June, 1922	9·0	14·8
July, 1922	11·9	14·4
August, 1922	12·0	13·3
September, 1922	9·0	16·6
October, 1922	1·9	8·0
Average	6·9	11·0

During the five winter months, the hens produced an average monthly record of 2·9 eggs per bird while the pullets produced 7·2. Throughout the entire year the hens produced 6·9 eggs per bird per month while the pullets averaged 11 eggs. It may also be pointed out that the hens had been selected from the best layers of the previous seasons, and also that the production of the hens during the winter months (the time of high priced eggs) was very low.

HENS VS. PULLETS FOR EGG PRODUCTION FOR HATCHING

It is usually found a good plan to keep over only the best one and two-year-old hens to produce eggs for hatching. If this is followed every year, the standard of the flock can be raised since the poor-laying birds are eliminated in their first year, consequently the eggs set are from the best producing stock.

The succeeding table shows the comparative results from hens' and pullets' eggs set during the past season:—

Ages	Number of eggs set	Per cent eggs fertile	Per cent fertile eggs hatched
Hens	551	93·2	63·4
Pullets	1,031	90·6	50·0

It was also noted that the death rate among the chicks hatched from pullets' eggs was nearly double that among the chicks hatched from the hens' eggs.

PEDIGREE RECORDS

The work of establishing pedigree records has been continued. An improvement in average and individual egg production has been noted already, although the work has only been under way at the Station for two years. One pullet laid 249 eggs in her first year and five others exceeded the 200-egg mark. One hen laid 240 eggs in her second laying year.

EGG-PRESERVING EXPERIMENT

In this country the price of eggs to the producer drops very low during the season of high production, and again there comes a time in the late fall and early winter when there are not sufficient eggs to meet local consumption and supplies even have to be shipped in.

In order to see if eggs could be held over with profit, from the time of plenty to the time of scarcity, and incidentally to find out the best method of holding them, 70 dozen were stored in various ways from 4 to 6½ months.

Detail of the methods used should not be given until further tests are made, except to state that water glass, lime water, dry salt, lard, bran, wrapped in paper, and cold storage were all used and the water glass method proved superior to all and is one of the methods so long advocated by the Dominion Chemist at Ottawa (see pamphlet No. 42).

At the time when this experiment was commenced, eggs were selling locally at 15 cents per dozen and at the conclusion of the experiment the eggs were sold on the local market as packed eggs at 35 cents per dozen.

INCUBATION

Four different makes of incubators were tested, as well as the natural method. The incubators were operated in the basement of the poultry administration building and the hens were set on the ground with small portable coops to protect them from the weather and from molestation by other birds or animals. The following table gives some of the particulars obtained from this experiment:—

TESTS OF DIFFERENT MAKES OF INCUBATORS

Name of incubator	Number of eggs set	Per cent eggs fertile	Per cent fertile eggs hatched
Buckeye	1,279	90·2	47·2
Prairie State	706	91·0	49·9
Tamlin	306	91·1	61·6
Queens	260	87·6	64·0
Hens	138	88·3	52·4

Owing to the unfavourable weather conditions, the hens were not set until May. The Queens incubator was not on hand for use for the early hatches, which accounts in part for the higher percentage of eggs hatched in this machine.

TIME OF HATCHING

Securing early chicks is undoubtedly one of the big problems in this climate. Early chicks are difficult to secure in northwestern Saskatchewan owing to the weather continuing cold until comparatively late. Eggs set under hens are easily chilled should the "brooders" leave their nests for any length of time. Incubators are helping to solve the difficulty, but unfortunately a remedy for the low hatches early in the spring has not yet been found. The following table gives the results obtained this year in the months of April, May and June.

TIME OF HATCHING

Time hatched	Total eggs set	Per cent eggs fertile	Per cent of fertile eggs hatched
April	1,105	90	43·0
May	1,111	90	53·3
June	473	89·8	68·2

The difficulty does not seem to be in the early fertility but in the fact that during April (when pullets should be hatched to get best production) the number of fertile eggs hatched is comparatively low.

Beef Scrap vs. Milk.—In order to determine the usefulnes of skim-milk as a feed for laying pullets, an experiment to compare it with beef scrap was started during the past winter. Sixty-two pullets were divided into two pens of twenty and forty-two each. Owing to a limited supply of milk the pen containing the lesser number was given the milk. The following table gives the particulars regarding the quantities of grain consumed, also the average returns per bird:—

FEEDING EXPERIMENT—BEEF SCRAP *vs.* MILK

	Beef Scrap, Pen 4		Milk, Pen 5	
	Weight	Value	Weight	Value
	Lbs.	$ cts.	Lbs.	$ cts.
Scratch grain	690	9 53	345	3 85
Meal mash	414	7 88	162	3 39
Beef scrap	49·5	2 47	.....	.....
Milk	.....	.....	418	4 18
Green feed	200	0 50	80	0 20
Grit	22	0 58	12	0 31
Shell	19	0 38	17	0 34
Charcoal	6	0 36	5	0 30

	Beef scrap	Milk
Total value of feed	$21 70	$12 57
Total value of feed per bird	0 51	0 66
Total egg production	1,068	735
Average egg production	25	36
Average cost of producing eggs per dozen	24·4c.	20·5c.

Birds in pen 5 were more healthy, which may have been due partly to more exercise.

The combs and wattles on the milk-fed lot were much higher in colour during the latter part of the experiment.

Milk valued at $1 per hundred pounds is cheaper for egg production than beef scrap at $5 per hundred pounds.

Milk is a valuable feed for laying hens and if available for the hens to drink there is no necessity to go to the expense of purchasing prepared beef scrap.

COST OF RAISING CHICKS

A commencement was made in ascertaining the cost of raising chicks. The figures quoted are the costs and return values from the time the first eggs were set, up to November 1. No charges have been made for eggs used for hatching or for labour, as these two items will vary widely in different flocks.

Cost of coal oil for incubators	$ 18 14
Cost of coal for brooder stoves	28 50
Cost of all feed up to November 1	99 96
Total cost aside from eggs and labour	$ 146 60

The stock on hand raised in 1922 are as follows:—

140 choice pullets.
46 choice cockerels.
41 inferior birds.

In addition, sales of broilers, cockerels, etc., totalling $70.80 were recorded. This amount deducted from the cost would make the total cost of the 227 birds, aside from eggs used in hatching, $75.80 or 33 cents per bird.

CRATE FATTENING

The experiments with crate fattening were started on September 8. Barred Rock cockerels were used; these were weighed up and put into coops with the exception of one lot that were allowed free range. The following table gives the particulars regarding the gains made during a ten-day period:—

Lot No.	Ration	Average gain made per bird
5	Ground peas, oats, corn and milk	12·8 oz.
1	Ground hull-less oats and milk	9·3 "
3	Ground rye, oats and milk	9·3 "
4	Ground barley, oats and milk	9·0 "
6	Free range with dry mash and whole grain	6·3 "
2	Crushed oats and milk	6·0 "

This is the first experiment on the Station to determine the feeding value of hulless oats. They made a fairly good showing and proved superior to the ordinary oats.

COMMERCIAL VS. HOME PREPARED MASH

Dry mash, fed through a self-feeding hopper, is becoming an important poultry feed and is used by a rapidly increasing number of poultrymen. Various mixtures are prepared both by the poultrymen themselves and by companies who sell them quite extensively.

In order to compare a home prepared and a commercially prepared mash for cheapness and for economy of egg production, an experiment was started on this Station last winter and continued for a period of four months.

The following table gives the ingredients and proportions used in preparing the home made mash:—

HOME-MADE MASH

First Three Months		*Fourth Month*	
Oat chop	300 lbs.	Oat chop	400 lbs.
Barley	150 "	Pea meal	100 "
Wheat	75 "	Corn	100 "
Bran	200 "	Shorts	100 "
Shorts	100 "	Bran	100 "
		Beef scrap	100 "

Total number of pounds of mash fed, 520.

The commercial mash was obtained from three firms. During the first part of the season the Quaker Oats preparation was used; later Blatchford's Meal Mash and a small quantity of Purple Poultry Mash was included. The commercial mash cost almost four cents a pound on an average and the home-prepared mash a little more than two cents.

The following table gives further particulars regarding this experiment:—

COMMERCIAL VS. HOME-PREPARED MASH

—	Commercial mash		Home prepared mash	
	Weight	Value	Weight	Value
	Lbs.	$ cts.	Lbs.	$ cts.
Scratch grain	860	9 52	910	10 18
Meal mash	621	24 36	520	10 86
Meat	58	2 90	76½	3 82
Green feed	219	0 54	235	0 58
Grit	32	0 85	18	0 46
Shell	25	0 50	23	0 46
Charcoal	5	0 30	7	0 42

	Commercial mash	Home prepared mash
Total value of feed	$38 97	$26 78
Total value feed per bird	0 78	0 53·7
Total egg production	1,495	1,805
Average egg production	30	36
Average cost of producing eggs per dozen	$ 0 31·2	$ 0 17·7

The home prepared mash was found to be just as palatable, the birds laid more eggs on it and it proved to be much cheaper.

Extension and Publicity

During the summer, an exhibit illustrating some of the work conducted on the Station was sent out to six fairs. There was a total attendance at these gatherings of about 9,800 people, most of whom inspected the exhibit.

In the midsummer months, there were a number of picnics and excursions to the Station organized by various farmers' associations. The Biggar Agricultural Society had a particularly successful day on July 26. In point of numbers, the Grain Growers' day was outstanding, some 1,800 persons visiting the Station on that day. On September 19, His Excellency the Governor General of Canada met the people of the district at the Station. There were about 1,000 people on hand to welcome His Excellency to the district.

The superintendent attended the Provincial Live Stock meetings in Regina; a Live Stock Conference of Provincial and Dominion officials in Saskatoon, a meeting of representatives of Agricultural Societies in the same city and the Prairie Experimental Farms Superintendents' conference at Indian Head. Later in the season, he attended the meetings of the Western Canada Live Stock Union and those of the Western Canadian Society of Agronomy. He also acted as Secretary to the Scott Percheron Breeders' Association. The Assistant to the Superintendent, in addition to taking out the Station exhibit to the fairs, addressed a number of farmers' gatherings in the western part of the district.