DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT

N. D. MacKENZIE, B.S.A.

FOR THE YEARS 1921 AND 1922

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

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EXPERIMENTAL STATION, INDIAN HEAD, SASK.

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For 1921 and 1922

SEASONAL NOTES

The crop years 1921 and 1922 were highly favourable for maximum crop production. Although the springs were somewhat backward, work started on the land the latter end of April, with seeding general the first week in May. A plentiful supply of moisture was recorded during the growing season in each of these years, which was conducive to rapid and luxuriant growth. An exception was the latter part of 1921, however. During the last two weeks in July the grain crops were subjected to hot winds, a severe attack of rust and considerable damage from the western wheat-stem saw-fly. Harvest was followed by heavy rains in September, which caused much grain to grow in the stook and delayed threshing, resulting in serious loss to farmers, due to lower grades for wheat and other grains. The crop season of 1921 was most unprofitable from the standpoint of net returns. Generally speaking, the season of 1922 was quite favourable and gave satisfactory returns. Grain and forage crops returned good yields, high in quality, and sold for good prices. Damage from hot winds and rust were unnoticeable. The wheat-stem saw-fly, however, was responsible for a small percentage of damage, especially in stubble crops.

In 1921 the Experimental Farm yields of grain were fair, with the exception of wheat, which suffered from rust and wheat-stem saw-fly damage. Forage crops were up to their usual high standard. In 1922 all grain and forage crops gave high yields and were of good quality. The highest yield of wheat in field lots was 48 bushels and 30 pounds per acre, as compared with 50 bushels and 52 pounds in 1915. Generally speaking, the crop year of 1922 may be regarded as the best and most profitable since 1915.

The meteorological records for 1921 and 1922 show a total precipitation of 25 inches and 19·59 inches, respectively, with a total rainfall of 10·83 inches and 9·29 inches during the growing season for each of these years. In September, 1921, the precipitation was rather excessive, amounting to 5·08 inches, which did considerable damage to grain standing in the stook, as already referred to in seasonal notes. A total of 1,887·8 hours sunshine was recorded in 1921, as compared with 1,794·6 in the year 1922.

ANIMAL HUSBANDRY

HORSES

During the year 1921 thirty horses were maintained on the Farm, as compared with twenty-eight in the year 1922. The majority of these horses are pure-bred Clydesdales, which are used for work on the Farm and the breeding of high-class Clydesdales.

In 1918 a number of local farmers organized a club, under the Federal Aid to Horse Breeders, for the purpose of improving the type of draught horses in the community. Each year a high-class stallion is secured for the use of the club members at a service fee ranging from $20 to $25, depending on the merit of the horse in service. The Live Stock Branch of the Federal Department of Agriculture assist these clubs to the extent of one-third—that is, on a $25 service fee the Live Stock Branch will pay $8.33. Thus, it will be

seen that the total cost to the farmer for a foal is $16.66. The club system has been of great advantage to the Experimental Farm, as well as to breeders of draught horses in the district. Many prizes have been won by animals bred on the Experimental Farm. In 1921 "Indian Head Belle" won first in the yearling class and Junior Championship of the Clydesdale breed at the International Exposition held at Chicago.

NAVEL ILL

For the purpose of gaining some information relative to the control of navel ill in foals, an experiment was undertaken, and the method of procedure was as follows: Treated mares were inoculated with mixed bacterial vaccines during the eighth month and again at the end of three weeks. Mares used as controls were not inoculated. All foals were inoculated with a weaker vaccine at time of birth and observations were made periodically thereafter to ascertain whether they showed any symptoms of the disease. Navel or joint ill is widely spread throughout the country and is a source of serious loss to horse breeders. In addition to the treatment outlined, every precaution is taken to have box-stalls clean and well disinfected before foaling.

The following table gives the average of three years' results:—

NAVEL ILL EXPERIMENTS—THREE YEARS' RESULTS

Number of mares	Treatment	Number of foals born	Treatment	Number of foals raised	Per cent foals raised
13	Inoculated	13	12 inoculated (1 dead at birth)	12	92·3
6	Not inoculated	6	6 inoculated	3	50·0

From the foregoing results, it will be observed that the relative percentage of foals raised from mares treated with vaccine as a preventative against navel ill is very much greater than when vaccines are not given. The results of three years' work indicate that the inoculation with vaccines is quite effective in controlling the disease, whereas, a mild treatment given the foal at birth is not effective.

COST OF FEEDING

The cost of maintaining horses in good condition during the year is always interesting to the farmer and breeder. During 1921 and 1922, careful records of the amount of feed consumed were kept for mature horses worked steadily throughout the year; horses worked during the summer and occasionally in winter; growing two-year-olds; and the foal from weaning to one-year-old. The cost of feed as given is only for the year in question and is determined by the average price of feeds prevailing in this district.

HORSES—AVERAGE COST FOR 1921 AND 1922

Description of Animal	Cost of feed 1921	Cost of feed 1922	Average cost for two years
	$ cts.	$ cts.	$ cts.
Horses working all year	82 61	72 25	77 43
Horses working in summer and idle in winter	69 13	61 00	65 06
Two-year-olds, going on three years	52 30	45 00	48 65
Yearling, going on two years	51 06	39 65	45 35
Foals—weaning to one year old	35 45	30 25	32 85

In reviewing the foregoing table of cost, it must be borne in mind that the feed given and consumed was for the development and the best possible growth, with the idea of maturing horses weighing 1,600 pounds and over.

CATTLE

The breeding herd consists entirely of pure-bred Shorthorns. The object in keeping the herd is to promote the best beef conformation combined with profitable milk production. During the year 1922 the cows and heifers which finished their lactation period produced an average yield of 4451·2 pounds of milk, testing 4·2 per cent butter fat.

The surplus bulls are sold to farmers for herd improvement. In 1921, five heifers and a bull were shipped to the Experimental Station, Scott, Sask., and a bull to the Experimental Station, Invermere, B.C.

Experimental work comparing the value of corn and sunflowers for ensilage purposes is under way.

RATIONS FOR PREGNANT COWS

Three groups of cows were fed during the winter on various rations to determine the effect on the calf crop. Lot 1 (six cows) received an average daily ration of 30 pounds of sunflower silage, 10 pounds of oat straw and sufficient grain, consisting of equal parts of bran and oats, to maintain the cattle in good condition. Lot 2 (six cows) received a similar ration, except that corn replaced the sunflower silage, while lot 3 (six cows) received mixed silage, together with 5 pounds of alfalfa hay and equal parts of bran and oats to maintain the animals in good condition.

The results of the test are herewith given.

COMPARISON OF RATIONS FOR PREGNANT COWS

Lot	Feed	Number of cows	Number of calves with goitre	Number of calves died from goitre	Remarks
1	Sunflower silage.....	6	6	3	Three calves slightly affected with goitre and fully recovered.
2	Corn silage.....	6	3	1	Remaining three calves perfectly normal.
3	Mixed silage and hay..	3	0	0	All calves perfectly normal.

The foregoing experiments have only been in operation for one year hence, cannot be regarded as conclusive. However, results would indicate that the use of sunflower silage in the ration, without other roughage, is not suitable for pregnant cows. The mixed silage and hay supplies the necessary nutrients for the development of healthy, normal calves.

SUNFLOWER VS. CORN SILAGE AS A ROUGHAGE FOR GROWING HEIFERS

Two lots of five heifers were fed a good growing ration, consisting of a mixture of silage and oat straw, alfalfa hay and a mixture of equal parts of oats, bran and shorts, sufficient to keep in good growing condition.

SUNFLOWER AND CORN SILAGE FOR GROWING HEIFERS

Lot	Feed	Initial weight	Weight in 30 days	Weight in 60 days	Weight at end of experiment	Gain
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	Sunflower silage.....	2,910	3,110	3,395	3,620	710
2	Corn silage.....	2,945	3,120	3,405	3,655	710

The foregoing results indicate that both rations produced identically the same increase in weight. However, according to observations made during the experiment, lot 2 were more thrifty looking and mellow to the touch, than were lot 1.

FEEDING STEERS

Owing to the lack of accommodation in 1921, experimental work with the feeding of steers was discontinued. However, in 1922 forty-five head of steers were purchased and placed in the feed lots for the purpose of comparing the returns received from two-year-olds, yearlings and calves.

STEER FEEDING EXPERIMENT—1922

—		Two-year	Yearlings	Calves
Number of steers in lot		15	15	15
Number of days on experiment		138	138	138
Average weight at commencement of experiment	Lbs.	988·7	802·7	439·3
Average weight at finish of experiment	"	1,286·0	1,045·3	638·7
Average daily gain	"	2·15	1·76	1·44
Total cost of feed	$	349 64	307 67	202 66
Cost of feed per 100 pounds gain	$	7 84	8 45	6 78
Initial cost per 100 pounds (freight, commission, etc.)	$	4 90	4 45	5 00
Total cost at finish of experiment	$	1,076 31	843 41	532 16
Average cost per steer at finish of experiment	$	71 75	56 23	35 48
Selling price per 100 pounds	$	5 75	5 75	5 05
Average selling price per steer	$	73 95	60 12	32 25
Average profit or loss per steer	$	2 22	3 89	−3 23

The results of the foregoing test are for one year and cannot be regarded as conclusive. Generally speaking, good beef type two-year-olds are regarded as the most profitable for the average farmer to feed, because of their maturity in growth and, as a consequence, the feed consumed goes toward the production of meat. While a loss is noted in the case of the calves, in the hands of a skilled feeder, yearlings and calves may be fed profitably as baby beeves, depending on condition when going into the feed lot and the proximity to a suitable market when finished. Success in steer feeding depends on three main factors: first, the right type of feeders; second, the ability to purchase at the right price—practically speaking, well bought is half sold; and third, the ability of the feeder to finish.

SHEEP

The flock, as maintained on the farm, is composed chiefly of pure-bred Shropshires, and also a number of grades which are used for the purpose of demonstrating the influence of pure-bred sires of correct type.

Improvement work with pure-bred sires of the Shropshire and Oxford breeds, using range ewes as a foundation, was carried to the fourth generation during the year and was brought to a conclusion, as improvement has been such that only minor breed characteristics remained to distinguish the grades from the pure-breds. This experiment was commenced in 1914, and the procedure was as follows: A lot of range ewe lambs were purchased in the fall of 1913 as foundation stock, and divided into two lots as nearly equal as possible. One lot was mated to a good-type, pure-bred Shropshire ram, and the other lot to a pure-bred Oxford ram. The resultant progeny, which constituted the first cross, were, in turn, mated to other rams of the same breeds, this process being repeated with the progeny until, with the 1921 lambs, the fourth generation, or cross, was reached.

The foundation ewes averaged 59 pounds in weight on November 1, when purchased as lambs. Unfortunately, no record was kept of their weight as mature ewes, and, in tabulating the results of the experiment, it was necessary to arrive at an approximate weight for these ewes. In a number of experiments conducted with similar ewes at other Stations, the ewes' weight was 115 pounds, on the average, so this has been taken as the nearest approximation possible under the circumstances. The following tables show the results of this work:—

IMPROVING GRADE FLOCKS

Breed	Average weight of lambs at birth				Average weight of lambs November 1					Average weight of mature ewes (shearlings)			
	Cross				Cross					Cross			
	1st	2nd	3rd	4th	Foundation stock	1st	2nd	3rd	4th	Foundation stock	1st	2nd	3rd
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Oxford.....	8·5	12·3	10·37	10·5	59·0	75·4	78·5	79·5	79·8	115·0	139·0	138·0	141·0
Shropshire...	9·39	8·8	9·4	9·5	59·0	70·5	73·7	75·0	76·5	115·0	129·5	138·7	139·0

Weight of Wool

Breed	Foundation stock	First cross	Second cross	Third cross
	Lbs.	Lbs.	Lbs.	Lbs.
Oxford grades.....	8·57	8·86	9·6	9·9
Shropshire grades.....	8·5	9·33	9·97	10·0

It is very noticeable that, in addtion to increasing the size of the animals at all stages of development and also the weight of wool, the succeeding crosses, in addition to resembling pure-breds, are very much more marketable; both as sheep and lambs, than the original foundation stock, and that this valuable characteristic increases with each generation. The original ewes were long in the neck and legs, shallow in the body and narrow as well, whereas, the fourth cross lambs are short in the leg and neck, compact and deep in body and carry a much greater proportion of their weight in the high-priced cuts, which explains their greater popularity on the market. A marked improvement in the length of staple of the wool is noticeable, and also in the more complete covering of the under part of the body with wool, which accounts for the greater weight of wool obtained in the successive crosses. The quality and density of the wool have not been improved to any noticeable extent. The individuality of the sires used is a factor which has a very marked influence on the resultant progeny and in the case of the two breeds which were used in the experiment, appears to be a much more important factor than the breed of the sire in obtaining the best results in the progeny.

FATTENING EXPERIMENTS WITH LAMBS

As most of the lamb crop in the country is marketed in rather thin condition during the fall, an experiment was undertaken to determine the profit in finishing lambs for the Christmas market.

Two groups of average lambs, which were valued, by buyers of lambs, at six cents per pound, were taken and put on feed November 1 to finish for the Christmas trade. Group 1 received all their feed in a shed and, in addition, had

the run of a good-sized yard. Group 2 were confined in a roomy pen in the shed, but not allowed the run of a yard. Both lots received the same meal and roughage, starting on feed at two pounds of alfalfa hay, a little pea straw and mixed grain, consisting of two parts of ground barley, two parts of ground oats and one part of bran, one pound per head daily, gradually increased until they were receiving two and one-half pounds per head. Water was given twice daily. The lambs were on feed a total of forty-three days. Both lots were thrifty, but made fair gains only and were sold at the end of the experiment at eight cents per pound.

The results are summarized as follows:—

FATTENING LAMBS

—		Shed	Shed and yard
Number of lambs		20	20
Number of days on experiment		43	43
Average weight at beginning of experiment	Lbs.	78·5	73·75
Average weight at finish of experiment	"	90·0	87·25
Average gain during experiment	"	11·5	13·5
Total cost of feed	$	34 30	34 30
Average cost of feed	$	1 71	1 71
Cost of feed per pound gain	c.	14·9	12·7
Average initial cost at 6 cents	$	4 71	4 43
Average value of lambs at finish of experiment at 8 cents	$	7 20	6 98
Average profit or loss per lamb	$	0 78	0 85

The results of data obtained from the foregoing experiment indicate that, with a two-cent spread per pound between the purchase and selling price, moderate profits over the cost of feed can be secured. However, the difference in gain, between the two lots—shed vs. shed and yard—is not sufficiently large to warrant any definite conclusion. A good shed for shelter, together with a small yard for exercise, is conceded to be good management and conducive to best returns.

FLOCK MANAGEMENT

The regular work of developing a pure-bred flock was continued in 1922, and new work commenced to determine the most profitable time to have lambs dropped in the farm flock. Ewes were bred to lamb in February, March, April, and May, most of them being dropped in April, in order to have some lambs available for feeding experiments in the fall. The ewes, until just previous to lambing, were housed in a single-board shed, with openings on the south and a fair sized yard for exercise. They were fed pea and oat straw and a little grain —one-half pound per head, daily, of mixed oats and bran—and, about a month before lambing, a moderate feed of alfalfa hay was given in place of most of the straw. Just previous to lambing, they were put in a part of the building which was double-boarded and could be closed up, but no artificial heat was provided. The equipment and feed were no better than could be given on any farm, so that the results are applicable anywhere in the West. The weather was decidedly cold during the time the February and March lambs were dropped, but no trouble was experienced in raising practically all.

The first lambs came on January 28, and on February 4 there were fourteen. The latest lambs were dropped on April 20.

While the earlier lambs were ready for market two months before the later ones, and showed better size and quality, there was great difficulty experienced

in having the ewes come into season, the result being a long lambing season and lambs varying greatly in age and size, which, of necessity, made the weaning time somewhat later than it should have been. The percentage of twins was low, there being an average of 1.2 lambs per ewe, or ninety-nine lambs from eighty-three ewes.

The following table shows average weights, month of lambing, month of sale, price per pound and amount obtained for lambs sold in June, July, August, and December:—

RETURNS FROM SALE OF LAMBS

Average weight	Month of lambing	Month of sale	Price per pound	Amount obtained
Lbs.			cts.	$ cts.
84·8	January 28 to February 28	June and July.	12½	10 60
75·33	February 16 to March 15	August	10½	7 91
77·7	March 1 to March 31	September	8½	6 60
77·9	March 15 to April 20	December	10½	8 18

From the above, it can clearly be seen that, where fair shelter for the lambs at lambing time can be had, the early lambing is the most profitable. While the lambs marketed in December were sold at a better price than those sold in September, the increase in cost, due to the feed necessary to put them on the market in good condition, made the net return only very slightly better.

SWINE

The breeding herd consists of pure-bred Yorkshires and Berkshires. The primary object is to develop first-class types, so that good breeding stock will be available for farmers throughout the district, and, at the same time, provide feeders for experimental purposes. However, owing to the heavy demand for breeding stock, as well as numerous sales to boys and girls for club work, the experimental work in comparing the suitability of annual pastures for young growing pigs had to be discontinued.

HAIRLESSNESS IN PIGS

The feeding of potassium iodide to brood sows was commenced for the purpose of controlling hairlessness in pigs. The sows had been wintered in straw-covered, A-shaped cabins, outside, and forced to take exercise by locating the cabins some distance away from the feed troughs. They were fed a mixture of ground oats and shorts, mixed in the proportion of two of oats to one of shorts. The hairlessness could not be attributed to lack of exercise or to receiving highly starchy feeds. In order to ascertain whether it was possible to control this trouble by the use of potassium iodide in the feed, the twelve breeding sows were divided into two equal groups, in the fall of 1920, and one lot received, in addition to their grain, one-eighth ounce of potassium iodide twice weekly in their feed. The housing and handling of the sows during the winter were, as nearly as possible, identical with the previous year, and the same for both lots. The following summary shows, in detail, the results of the experiment:—

Sows Receiving Potassium Iodide

No. of sow	Breed	Date of farrowing	Total pigs farrowed	Number of pigs dead at birth or shortly after	Number of pigs hairless
1	Berkshire	April 17	10	8	6
2	Yorkshire	" 22	9	3	0
3	Berkshire	May 2	8	2	0
4	Berkshire	" 7	8	1	0
5	Yorkshire	" 23	10	6	1
6	Yorkshire	June 1	11	2	0
	Total		56	22	7

Sows Not Receiving Potassium Iodide

No. of sow	Breed	Date of farrowing	Total pigs farrowed	Number of pigs dead at birth or shortly after	Number of pigs hairless
1	Berkshire	April 21	3	0	0
2	Berkshire	" 25	6	1	0
3	Yorkshire	May 4	10	3	0
4	Yorkshire	" 6	13	9	6
5	Yorkshire	" 8	10	3	0
6	Berkshire	June 2	11	4	0
	Total		53	20	6

Further experimental work will be continued in order to gain more definite information regarding the use of potassium iodide in the control of hairlessness in pigs.

HOG PASTURES

During the summer of 1922, an experiment was conducted comparing various types of pastures for growing pigs. Six different pastures and mixtures were sown on quarter-acre lots and were pastured off when ready. In addition to the pasture, the young pigs received sufficient meal (oats, shorts, barley and tankage) to keep them growing well. All lots received the same amount of grain per pig. The grain was hand-fed and water was available as required. Shelter was provided by A-shaped cabins in each enclosure. The results of the test are given in the following table:—

Comparison of Hog Pastures—1922

—	Oats and barley	Barley and rye	Oats	Oats and rye	Barley	Rape
Number of hogs in experiment	6	6	6	5	6	6
Days on experiment	56	56	56	56	56	56
Average initial weight Lbs.	65·0	66·3	66·7	62·2	61·0	65·0
Average final weight "	120·7	111·5	117·3	119·0	121·3	123·3
Average gain on pasture "	55·7	45·2	50·6	56·8	60·3	58·3
Average cost of meal while on pasture $	1 81	1 81	1 81	1 81	1 81	1 81
Average value of gain at 9½ cents per pound $	5 15	4 18	4 68	5 25	5 58	5 39
Relative value of pasture per acre $	20 60	16 72	18 72	21 00	22 32	21 56

While, in actual gains, the barley proved the most useful in this test, it should be noted that the rape would have provided feed for a much longer period than any of the spring grains and is to be preferred as a single pasture on that account. The barley and oats were good during the experiment, and appeared palatable, but the addition of the rye to either of these appeared to decrease the palatability of the crop, although lengthening the period of succulent growth.

GRAIN MIXTURE FOR HOGS

To determine the more suitable mixture of barley and shorts for finishing hogs for the fall market, four uniform pens of six hogs each were used and duplicate tests made of two mixtures; first, three parts barley and one part shorts, and second, two parts barley and one part shorts—with a ten per cent addition of tankage to each mixture. Hogs were fed in the piggery, without outside exercise.

As these hogs were, mainly, those that were not sufficiently fitted for the market on the previous pasture experiment, they were fed heavily to begin with, each pen receiving 24 pounds, daily, of their respective grain mixtures.

The mixture of two parts barley and one part shorts not only made the heavier and cheaper gains, but also produced more select market hogs. A summary of the feeding test follows:—

GRAIN MIXTURES FOR HOGS

—		Three parts barley and one part shorts		Two parts barley and one part shorts	
		Pen 1	Pen 2	Pen 1	Pen 2
Number of hogs in pen		6	6	6	6
Number of days on test		49	49	49	49
Initial weight	Lbs.	782	662	680	596
Final weight	"	1,209	1,083	1,160	1,122
Gain	"	427	421	480	526
Barley consumed at 1 cent per pound	"	882	882	784	784
Shorts consumed at 1½ cents per pound	"	294	294	392	392
Tankage consumed at 3 cents per pound	"	184	184	184	184
Cost of feed	$	17 65	17 65	17 77	17 77
Value of gain at 8½ cents per pound	$	35 23	34 73	39 60	43 40
Value of gain over cost of feed	$	17 58	17 08	21 83	25 63
Average value of gain of pens in each test	$	17 33		23 73	
Value of gain of 2 parts barley and 1 part shorts over 3 parts barley and 1 part shorts	$			6 40	
Cost per pound gain	$	4 16		3 53	
Amount of grain and tankage fed to make 1 pound gain	Lbs.	3 20		2 70	

FIELD HUSBANDRY

ROTATIONS

During the years 1910 and 1911 a series of rotations was started for the purpose of gaining information regarding a suitable system of farming for south-eastern Saskatchewan. In 1921 minor changes were made in the crop sequence of rotations " J " and " P " for the purpose of correcting obvious defects which were observed during the first nine years of operation. These rotations are as follows:—

—	Rotation "C"	Rotation "J"	Rotation "P"	Rotation "R"
1st year	Wheat	Wheat	Wheat	Wheat
2nd year	Wheat	Oats	Oats	Oats
3rd year	Fallow	Corn	Corn	Fallow
4th year	.....	Wheat (seeded down)	Barley (seeded down)	Wheat
5th year	.....	Hay	Hay	Oats (seeded down)
6th year	.....	Pasture and break	Hay or pasture	Hay
7th year	.....	.....	Hay or pasture	Hay or pasture
8th year	.....	.....	Hay and break	Pasture and break
9th year	.....	.....	.....	Corn

ROTATION " C "

It will be observed that this rotation is the one in common use throughout the province. The crop sequence has certain advantages in newly settled districts, in that it provides straight cash crops with a minimum of horse and manual labour, thus allowing the beginner to get established at a low cost. However, in the older established districts, where mixed farming is carried on to some extent, rotation " C " lacks many of the essential features in up-to-date farming methods. The continuous crop sequence of wheat, wheat and fallow is conducive to soil drifting and weeds, and makes no provision for forage crops for live stock.

ROTATION " R "

This is a nine-year rotation, the crop sequence being wheat, oats, fallow, wheat, oats (seed down to a mixture of alfalfa and western rye grass), hay, hay, pasture and break, corn in the final year. It is a mixed farming rotation and suitable for the keeping of live stock. However, two-ninths of the area is sown in wheat, which provides a cash crop in the fall. On the other hand, coarse grains, in the form of oats, are grown, as well as hay and pasture, and corn for silage purposes. Generally speaking, in good farming practice, coarse grains, such as oats and barley (except when sold for seed purposes) should be marketed direct as dairy produce, or on the hoof, in the form of beef, mutton or pork.

ROTATION " J "

The original crop sequence in " J ", as inaugurated in 1911, was as follows: fallow, wheat, wheat, oats (seeded down), hay, pasture. In order to eliminate the bare fallow and the growing of three grain crops in succession, a change was made in 1921, and the rotation remodelled as follows: wheat, oats, corn, wheat (seeded down), hay, hay and break. The foregoing system does away with the bare fallow, allows for one-third of the area to be producing wheat as a cash crop, and provides hay for roughage and corn for ensilage. The most serious objection to such a sequence is that it lacks pasture.

ROTATION " P "

The crop sequence in this rotation is of eight years' duration, and, as originally inaugurated, was as follows: fallow, hoed crop with manure, wheat, oats, fallow, wheat, oats (seeded down), hay, pasture. After nine years' observation, the above system was considered too expensive and a new sequence was established in 1921. The new system is as follows: wheat, oats, corn, barley (seeded down), hay, hay, hay and pasture, pasture and break. It will be noted in the new system that the bare fallows have been eliminated and barley has been replaced by wheat, making rotation " P ", under its present sequence, almost ideal for mixed farming.

The results of these rotations during the years 1921 and 1922 are reported in the following tables:—

ROTATION "C"—THREE YEARS

Description—First year, wheat; second year, wheat; third year, fallow

Crop	Area	Rent and manure	Seed, twine, and machinery	Cost of Labour				Total cost of crop	Yield per acre	Value per acre	Cost per acre	Cost per bushel	Profit or loss per acre
				Manual	Horse	Thresh-ing	Total						
1921	Acres	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	Bush.	$ cts.	$ cts.	$ cts.	$ cts.
Wheat	5 66	16 98	20 80	9 00	20 67	21 48	51 15	88 93	31·6	57 20	15 71	0 50	41 09
Wheat	5 66	16 98	17 76	7 80	42 03	16 32	66 15	100 89	24·3	43 97	17 83	0 74	26 14
Fallow	5 66	16 98	4 53	.....	46 20	.....	46 20	67 71	.....	.....	11 96	.....	−11 96
1922													
Wheat	5 85	17 55	17 17	4 50	33 55	13 09	51 14	85 86	18·6	15 07	14 68	0 79	0 39
Fallow	5 85	17 55	4 68	.....	39 90	.....	39 90	72 13	.....	.....	12 33	.....	−12 33
Wheat	5 85	17 55	20 13	6 50	18 80	24 25	49 55	87 23	34·5	27 95	14 91	0 43	13 04

Rotation "J"—Six Years

Description—First year, corn; second year, barley (seeded down); third year, fallow; fourth year, fallow; fifth year, fallow; sixth year, oats

Crop	Area	Rent and manure	Seed, twine, and machinery	Cost of Labour				Total cost of crop	Yield per acre	Value per acre	Cost per acre	Cost per unit	Profit or loss per acre
				Manual	Horse	Threshing	Total						
1921	Acres	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	Tons	$ cts.	$ cts.	$ cts.	$ cts.
Corn	4 54	22 80	12 41	37 88	72 80	.....	110 68	145 89	14·62	58 48	32 13	2 20	26 35
									Bush.				
Barley (seeded down)	4 54	22 80	19 52	7 65	30 53	28 52	66 70	119 02	62·8	29 58	26 22	0 42	3 36
Fallow	4 54	22 80	3 63	.....	19 60	.....	19 60	46 03	.....	.....	10 14	.....	−10 14
Fallow	4 54	22 80	3 63	.....	19 60	.....	19 60	46 03	.....	.....	10 14	.....	−10 14
Fallow	4 54	22 80	3 63	.....	19 60	.....	19 60	46 03	.....	.....	10 14	.....	−10 14
Oats	4 86	23 76	18 51	7 95	55 65	26 67	90 27	132 54	61·0	21 41	27 27	0 45	−5 86
1922									Bush.				
Wheat	4 54	22 70	25 02	5 75	10 10	25 88	41 73	89 45	47·5	35 63	19 70	0 41	15 93
									Tons				
Hay	4 54	22 70	19 55	3 75	10 75	.....	14 50	56 75	1·37	21 92	12 50	9 12	9 42
									Bush.				
Wheat	4 75	23 75	14 51	5 75	16 20	23 00	44 95	83 21	40·3	30 23	17 75	0 43	12 48
Wheat	4 92	24 60	15 42	6 50	18 05	26 67	51 22	91 24	45·2	36 62	18 54	0 41	18 08
Oats	4 25	21 25	15 29	5 50	16 36	31 14	53 00	89 54	81·4	24 42	21 07	0 26	3 35
									Tons				
Corn	4 86	24 30	10 55	52 25	86 08	.....	138 33	173 18	11·72	46 88	35 61	3 04	11 27

Rotation "P"—Eight Years

Description—First year, oats; second year, corn; third year, barley (seeded down); fourth year, hay; fifth year, hay; sixth year, hay; seventh year, hay and break; eighth year, wheat

Crop	Area	Rent and manure	Seed, twine, and machinery	Cost of Labour				Total cost of crop	Yield per acre	Value per acre	Cost per acre	Cost per unit	Profit or loss per acre
				Manual	Horse	Threshing	Total						
1921	Acres	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	Bush.	$ cts.	$ cts.	$ cts.	$ cts.
Oats	6	27 00	23 72	9 00	41 95	33 85	84 80	135 52	62·7	22 01	22 59	0 36	0 58
Corn	6	27 00	20 15	94 50	113 48	.....	207 98	255 13	Tons 11·47	45 88	42 52	3 71	3 36
Barley (seeded down)	6	27 00	24 77	26 70	36 30	32 80	95 80	147 57	Bush. 54·7	24 51	24 60	0 45	−0 09
Hay	6	27 00	7 68	1 35	26 85	.....	28 20	62 88	.....	.....	10 48	.....	−10 48
Hay	6	27 00	16 88	8 70	19 20	.....	27 90	71 78	Tons 1·75	28 00	11 96	6 83	17 04
Hay	6	27 00	16 88	7 80	21 70	.....	29 50	73 38	2·06	32 96	12 23	5 94	20 73
Hay and break	6	27 00	16 88	7 65	56 65	.....	64 30	108 18	1·93	30 88	18 03	9 34	12 85
Wheat	6	27 00	22 08	10 20	27 88	14 04	52 12	101 10	19·5	15 80	16 85	0 86	−1 05
1922													
Corn	5·5	24 26	11 87	71 00	88 93	.....	159 93	196 06	13 80	55 20	35 65	2 58	19 55
Barley (seeded down)	5·77	25 44	21 19	6 00	21 75	36 17	63 92	110 55	Bush. 62·7	29 59	19 15	0 31	10 44
Hay	6·0	26 46	15 30	3 81	18 25	.....	22 06	63 82	Tons 2·26	36 16	10 64	4 71	25 52
Hay	6·0	26 46	15 30	5 50	20 88	.....	26 38	68 14	3·16	50 56	11 36	3 59	39 20
Hay	6·0	26 46	15 30	11 75	27 00	.....	38 75	80 51	2·55	40 80	13 42	5 26	27 38
Hay	6·0	26 46	15 80	12 00	19 25	.....	31 25	73 01	2·00	32 00	12 17	6 09	19 83
Wheat	5·78	25 49	21 93	6 75	46 83	33 75	87 33	134 75	Bush. 48·7	39 37	23 31	0 48	16 06
Oats	5·77	25 44	22 29	6 25	33 20	47 32	86 77	134 50	91·1	31 98	23 30	0 26	8 68

Rotation "R"—Nine Years

Description—First year, fallow; second year, wheat; third year, oats (seeded down); fourth year, hay; fifth year, hay; sixth year, hay and break; seventh year, corn; eighth year, wheat; ninth year, oats

Crop	Area	Rent and manure	Seed, twine, and machinery	Cost of Labour				Total cost of crop	Yield per acre	Value per acre	Cost per acre	Cost per unit	Profit or loss per acre
				Manual	Horse	Thresh-ing	Total						
1921	Acres	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	Bush.	$ cts.	$ cts.	$ cts.	$ cts.
Wheat	5·5	23 83	21 51	9 00	29 85	17 07	55 92	101 26	25·9	20 95	18 41	0 71	2 54
Oats	5·5	23 83	20 49	5 93	32 68	37 11	75 72	120 04	75·0	26 33	21 83	0 29	4 50
Fallow	5·5	23 83	4 40	.....	39 95	.....	39 95	68 18	.....	.....	12 40	.....	-12 40
Wheat	5·5	23 83	22 15	6 72	19 55	22 45	48 72	94 73	34·0	27 54	17 22	0 51	10 32
Oats (seeded down)	5·5	23 83	13 93	6 98	39 03	30 91	76 92	114 68	62·5	21 93	20 85	0 33	1 08
									Tons				
Hay	5·5	23 83	19 66	20 10	18 25	.....	38 35	82 84	1·78	28 48	15 06	8 46	13 42
Hay	5·5	23 83	15 47	9 90	17 13	.....	27 03	66 33	2·03	32 48	12 06	5 94	20 42
Hay and fallow	5·5	23 83	15 47	16 20	82 83	.....	99 03	148 33	2·13	34 08	26 97	12 66	7 11
Corn	5·5	23 83	19 79	75 75	47 38	.....	123 13	166 75	10·30	41 20	30 32	2 94	10 88
1922													
Oats	5·0	21 90	19 81	5 00	30 05	31 13	66 18	107 89	69·2	24 26	21 58	0 31	2 68
Fallow	5·92	25 93	4 74	.....	28 20	.....	28 20	58 87	.....	.....	9 94	.....	−9 94
Wheat	3·7	16 21	13 31	3 75	13 45	19 32	36 52	66 14	43·5	35 24	17 88	0 41	17 36
Oats (seeded down)	6·72	29 43	24 12	6 75	29 60	31 26	67 61	121 16	51·7	18 15	18 03	0 35	0 12
									Tons				
Hay	5·63	24 66	19 77	4 00	18 13	.....	22 13	66 56	1·70	27 04	11 82	6 95	15 22
Hay	5·5	24 09	19 67	11 06	17 63	.....	28 69	72 45	1·83	29 28	13 17	7 19	16 11
Hay and break	5·5	24 09	19 67	12 13	18 88	.....	31 01	74 77	1·79	28 64	13 59	7 59	15 05
Corn	5·5	24 09	13 86	55 00	122 35	.....	177 35	215 30	13·80	55 20	39 15	2 84	16 05
									Bush.				
Wheat	4·25	18 62	15 01	4 50	13 65	15 88	34 03	67 66	31·1	25 19	13 57	0 43	11 62

COST OF PRODUCING FARM CROPS

The cost of production is always interesting to the farmer, in that it gives an approximate idea between profit and loss. Generally speaking, a large percentage of the farmers do not know how much it costs them to produce a bushel of wheat, oats or barley. The rotation records provide excellent means for keeping an accurate account of the cost of producing the various crops grown on the farm.

It will be noted that, with the comparatively high yields obtained in 1922, the cost of producing a bushel of wheat is fairly moderate, namely, 73 cents per bushel. However, where corn is used as a crop to replace the bare fallow, the cost per bushel is only 47 cents. This will indicate the importance of growing a hoed crop, or some kind of summer-fallow substitute, wherever possible.

The cost of production will be observed in the following tables.

COST OF PRODUCING WHEAT AFTER FALLOW—1921

Rent of land—5·25 acres—2 years at $4 per acre	$ 42 00
Use of machinery—2 years at $1.20 per acre	12 60
Manure—5·25 acres (12 tons per acre over 9 years) at $1 per ton	14 00
Ploughing, 1920—man and 3 horses, 26¼ hours at 60 cents per hour	15 75
Cultivating, 1920—man and 3 horses, 23 hours at 60 cents per hour	13 80
Cultivating, 1921—man and 3 horses, 8 hours at 60 cents per hour	4 80
Harrowing, 1921—man and 3 horses, 2 hours at 60 cents per hour	1 20
Seeding, 1921—man and 3 horses, 3¾ hours at 60 cents per hour	2 25
Seed—7 bushels and 50 pounds wheat at $1.75 per bushel	13 70
Cutting, 1921—man and 3 horses, 6 hours at 60 cents per hour	3 60
Stooking, 1921—man, 10½ hours at 30 cents per hour	3 50
Threshing—187 bushels at 12 cents per bushel	22 44
Twine—19 pounds at 19 cents per pound	3 61
Total	$ 153 25
Total yield—5·25 acres—187 bushels.	
Yield per acre—35 bushels and 40 pounds.	
Cost per acre	$ 29 17
Cost per bushel	0 82

NOTE.—It should be noted that this cost per bushel is low only on account of the high yield per acre, and that as the yield decreases the cost per bushel increases.

COST OF PRODUCING WHEAT AFTER FALLOW—1922

Rent of land—5·85 acres—2 years at $3.40 per acre	$ 39 78
Use of machinery—2 years at $1 per acre	11 70
After harvest cultivation, 1920—man and 3 horses, 34 5/12 hours at 55 cents per hour	18 93
Ploughing, 1921—man and 3 horses, 21½ hours at 55 cents per hour	11 83
Cultivation, 1921—man and 3 horses, 21 hours at 55 cents per hour	11 55
Cultivation, 1922—man and 3 horses, 10 hours at 55 cents per hour	5 50
Seeding, 1922—man and 3 horses, 4 hours at 55 cents per hour	2 20
Seed—7 bushels and 40 pounds at $1.75 per bushel	13 40
Cutting, 1922—man and 3 horses, 6½ hours at 55 cents per hour	3 58
Stooking, 1922—3 men, 5 hours at 25 cents per hour	3 75
Twine—15 pounds at 13½ cents per pound	2 02
Threshing—202 bushels at 12 cents per bushel	24 24
Total	$ 148 48
Total yield—5·85 acres—202 bushels and 5 pounds.	
Yield per acre—34 bushels and 42 pounds.	
Cost per acre	$ 25 39
Cost per bushel	0 73

COST OF PRODUCING WHEAT ON CORN LAND—1921

Rent of land—5·25 acres—at $4 per acre	$ 21 00
Use of machinery at $1.20 per acre	6 30
Manure—5·25 acres (12 tons per acre over 9 years) at $1 per ton	7 00
Discing—man and 3 horses, 11 hours at 60 cents per hour	6 60
Harrowing—man and 3 horses, 2 hours at 60 cents per hour	1 20
Seed—7 bushels and 50 pounds, at $1.75 per bushel	13 70

COST OF PRODUCING WHEAT ON CORN LAND—1921—*Concluded*

Seeding—man and 3 horses, 4 hours at 60 cents per hour	2 40
Harrowing—man and 3 horses, 2 hours at 60 cents per hour	1 20
Cutting—man and 3 horses, 11 hours at 60 cents per hour	6 60
Stooking—man, 14 hours at 30 cents per hour	4 20
Twine—18 pounds at 19 cents per pound	3 42
Threshing—145 bushels at 12 cents per bushel	17 40
Total	$ 91 02
Total yield—5·25 acres—145 bushels.	
Yield per acre—27 bushels and 32 pounds.	
Cost per acre	$ 17 34
Cost per bushel	0 63

COST OF PRODUCING WHEAT ON CORN LAND—1922

Rent of land—4·25 acres—at $3.40 per acre	$ 14 45
Use of machinery—4·25 acres—at $1 per acre	4 25
Manure—4·25 acres (12 tons per acre, over 9 years) at $1 per ton	5 47
Cultivating, 1922—man and 3 horses, 5½ hours at 55 cents per hour	3 03
Seeding, 1922—man and 3 horses, 3 5/6 hours at 55 cents per hour	2 11
Harrowing, 1922—man and 3 horses, 2 hours at 55 cents per hour	1 10
Seed—5 bushels and 40 pounds at $1.75 per bushel	9 92
Cutting, 1922—man and 3 horses, 4¾ hours at 55 cents per hour	2 61
Stooking, 1922—man, 10 hours at 25 cents per hour	2 50
Threshing—132 bushels and 20 pounds at 12 cents per bushel	15 87
Twine—12½ pounds at 13½ cents per pound	1 69
	$ 63 00
Total yield—4·25 acres—132 bushels and 20 pounds.	
Yield per acre—31 bushels and 8 pounds.	
Cost per acre	$ 14 56
Cost per bushel	0 47

COST OF PRODUCING WHEAT ON FALL PLOUGHED STUBBLE—1921

Rent of land—5·66 acres—at $4 per acre	$ 22 64
Use of machinery—5·66 acres—at $1.20 per acre	6 79
Ploughing, 1920—man and 3 horses, 29 hours at 60 cents per hour	17 40
Cultivating, 1920—man and 3 horses, 6 hours at 60 cents per hour	3 60
Cultivating, 1921—man and 3 horses, 6 hours at 60 cents per hour	3 60
Harrowing, 1921—man and 3 horses, 1¾ hours at 60 cents per hour	1 05
Seed—6⅓ bushels at $1.75 per bushel	11 08
Seeding—man and 3 horses, 4½ hours at 60 cents per hour	2 55
Cutting—man and 3 horses, 8 hours at 60 cents per hour	4 80
Twine—10½ pounds at 19 cents per pound	1 99
Stooking—man, 14 hours at 30 cents per hour	4 20
Threshing—136 bushels at 12 cents per bushel	16 32
Total	$ 96 02
Total yield—5·66 acres—136 bushels.	
Yield per acre—23 bushels and 15 pounds.	
Cost per acre	$ 16 96
Cost per bushel	0 71

COST OF PRODUCING WHEAT ON FALL PLOUGHED STUBBLE—1922

Rent of land—5·85 acres—at $3.40 per acre	$ 19 89
Use of machinery—5·85 acres—at $1 per acre	5 85
After harvest cultivation, 1921—man and 3 horses, 30½ hours at 55 cents per hour	16 77
Cultivation, 1922—man and 3 horses, 6¼ hours at 55 cents per hour	3 44
Seeding, 1922—man and 3 horses, 4 hours at 55 cents per hour	2 20
Harrowing, 1922—man and 3 horses, 3 hours at 55 cents per hour	1 65
Cutting, 1922—man and 3 horses, 5½ hours at 55 cents per hour	3 02
Seed—6¾ bushels at $1.75 per bushel	11 37
Stooking, 1922—man, 10 hours at 25 cents per hour	2 50
Twine—8¼ pounds at 13½ cents per pound	1 11
Threshing—109 bushels at 12 cents per bushel	13 08
Total	$ 80 88
Total yield—5·85 acres—109 bushels and 4 pounds.	
Yield per acre—18 bushels and 38 pounds.	
Cost per acre	$ 13 82
Cost per bushel	0 74

COST OF PRODUCING OATS ON FALL PLOUGHED STUBBLE—1921

Rent of land—5·5 acres—at $4 per acre	$ 22 00
Use of machinery—5·5 acres—at $1.20 per acre	6 60
Manure (12 tons per acre, over 9 years) at $1 per ton	7 32
Ploughing, 1920—man and 3 horses, 19 hours at 60 cents per hour	11 40
Cultivating, 1921—man and 3 horses, 7½ hours at 60 cents per hour	4 50
Harrowing, 1921—man and 3 horses, 1 5/6 hours at 60 cents per hour	1 10
Seed—13½ bushels at $1 per bushel	13 50
Seeding—man and 3 horses, 3½ hours at 60 cents per hour	2 10
Cutting—man and 3 horses, 6 hours at 60 cents per hour	3 60
Twine—12½ pounds at 19 cents per pound	2 37
Srookung—man, 9¾ hours at 30 cents per hour	2 93
Threshing—440 bushels at 9 cents per bushel	39 60
Total	$ 117 02
Total yield—5·5 acres—440 bushels.	
Yield per acre—80 bushels.	
Cost per acre	$ 21 28
Cost per bushel	0 26½

COST OF PRODUCING OATS ON FALL PLOUGHED STUBBLE—1922

Rent of land—5·77 acres—at $3.40 per acre	$ 19 63
Use of machinery—5·77 acres—at $1 per acre	5 77
Manure—5·77 acres (12 tons per acre, over 8 years) at $1 per ton	8 66
Plowing, October, 1921—man and 3 horses, 21 hours at 55 cents per hour	11 55
Cultivating, May, 1922—man and 3 horses, 7 hours at 55 cents per hour	3 85
Seeding, May, 1922—man and 3 horses, 3 5/6 hours at 55 cents per hour	2 11
Harrowing, May, 1922—man and 3 horses, 4 hours at 55 cents per hour	2 20
Seed—14 bushels and 24 pounds at $1 per bushel	14 70
Cutting, 1922—man and 3 horses, 7 hours at 55 cents per hour	3 85
Stooking, 1922—man, 13 hours at 25 cents per hour	3 25
Twine—22 pounds at 13½ cents per pound	2 97
Threshing—525 bushels and 25 pounds at 9 cents per bushel	47 32
Total	$ 125 86
Total yield—5·77 acres—525 bushels and 25 pounds.	
Yield per acre—90 bushels and 20 pounds.	
Cost per acre	$ 21 80
Cost per bushel	0 24

COST OF PRODUCING BARLEY AFTER CORN—1922

Rent of land—5·77 acres—at $3.40 per acre	$ 19 62
Use of machinery—5·77 acres—at $1 per acre	5 77
Manure—5·77 acres (12 tons per acre, over 8 years) at $1 per ton	8 66
Cultivation, May, 1922—man and 3 horses, 8½ hours at 55 cents per hour	4 68
Seeding, May, 1922—man and 3 horses, 4 hours at 55 cents per hour	2 20
Seed—10 bushels and 45 pounds at $1.25 per bushel	13 66
Cutting, August, 1922—man and 3 horses, 6 hours at 55 cents per hour	3 30
Stooking—4 men, 3 hours at 25 cents per hour	3 00
Threshing—361 bushels and 32 pounds at 10 cents per bushel	36 16
Total	$ 97 05
Total yield—5·77 acres—361 bushels and 32 pounds.	
Yield per acre—62 bushels and 31 pounds.	
Cost per acre	$ 16 82
Cost per bushel	0 27

COST OF PRODUCING CORN SILAGE—1922

Rent of land—5·5 acres at $3.40 per acre	$ 18 70
Use of machinery at $1 per acre	5 50
Manure—5·5 acres (12 tons per acre, over 9 years) at $1 per ton	7 33
Ploughing, August, 1921—man and 3 horses, 35 hours at 55c. per hour	19 25
Discing, October, 1921—man and 3 horses, 6 hours at 55 cents per hour	3 30
Discing and harrowing, May, 1922—man and 3 horses 10 hours at 55 cents per hour	5 50
Seeding, May, 1922—man and 2 horses, 5 hours at 45 cents per hour	2 25
Cultivation, June and July, 1922—man and 2 horses, 24 hours at 45 cents per hour	10 80
Hoeing—3 men, 30½ hours at 25 cents per hour	22 75
Cutting, September, 1922—man and 3 horses, 8½ hours at 55 cents per hour	4 68

COST OF PRODUCING CORN SILAGE—1922—*Concluded*

Twine—32 pounds at 13½ cents per pound		4 32
Pitching, September, 1922—man, 44 hours at 25 cents per hour		11 00
Hauling, September, 1922—man and 2 horses, 55 hours at 45 cents per hour		24 75
Silo-filling—equipment rental, 11½ hours at $2.50 per hour		28 75
Tramping silage—3 men, 11½ hours at 25 cents per hour		8 63
Seed—3 bushels at $1.30 per bushel		3 90
Total		181 41
Total yield—5·5 acres—75 tons and 1,840 pounds		
Yield per acre—13 tons and 1,600 pounds.		
Cost per acre	$	32 98
Cost per ton		2 39

COST OF PRODUCING ALFALFA AND WESTERN RYE GRASS HAY—1922

Rent of land—6 acres at $3.40 per acre		20 40
Use of machinery—6 acres—at $1 per acre		6 00
Manure—6 acres (12 tons per acre, over 8 years) at $1 per ton		9 00
Seed, 1920 (over 4 years)—60 pounds Western rye at 24 cents per pound		3 60
36 pounds alfalfa at 59 cents per pound		5 31
Packing, 1920 (over 4 years)—man and 4 horses, 2¼ hours at 65 cents per hour ($1.46)		0 36
Mowing, 1922—man and 2 horses, 13 hours at 45 cents per hour		5 85
Raking and tedding, 1922—man and 2 horses, 18½ hours at 45 cents per hour		8 33
Coiling and pitching, 1922—3 men, 15¾ hours at 25 cents per hour		11 75
Hauling, 1922—2 men and 4 houses, 11½ hours at 90 cents per hour		10 35
Two men in mow, 11 hours at 25 cents per hour		5 50
Total		86 45
Total yield—6 acres (2 cuttings)—15 tons and 560 pounds.		
Yield per acre—2 tons and 593 pounds.		
Cost per acre	$	14 41
Cost per ton		6 28

CULTURAL INVESTIGATIONS

The cultural investigation experiments started in 1911 were discontinued in the fall of 1920, and were rearranged to cover a greater variety of crops and to meet changes in methods of treatment demanded by the present system of farming. Results from these tests will be published in future reports.

HORTICULTURE

The seasons of 1921 and 1922 were above the average from a horticultural standpoint. An abundance of rainfall during the growing season, with ample sunshine and absence of severe frosts until late in the fall, combined to give heavy crops of all garden produce.

Annual and perennial flowers made a splendid showing and were considerably above the average for several years.

Flowering bulbs came through the winter in excellent condition and produced an abundance of bloom in both seasons.

Fruit trees and bushes came into bloom early and set a medium crop. Unfortunately, however, the 1922 crop was badly damaged by wind and hail on June 22, almost all plums and crabapples being stripped from the trees.

Raspberries produced a good crop, while currants and gooseberries were affected in both seasons by a species of fruit fly, which damaged the fruit to such an extent that the crop was practically of no value. Specimens of this fly were secured and forwarded to the Entomological Division and the information received will be of value in controlling the pest in the future.

Insect pests, more especially the fall canker worm, were prevalent in both seasons, but were kept under control by several sprayings of insecticides at the proper time.

VEGETABLES

ASPARAGUS.—The varieties under test are Palmetto, Barr Mammoth and Conover Colossal. Little difference is shown in quality and hardiness, although Palmetto is possibly slightly the heaviest producer. The first cutting was made on May 15.

BEANS.—Sixteen varieties of string beans were sown in the garden on May 23, and the first picking was made on July 27 from Davis White Wax, which is the earliest sort at present under test. Plentiful French, Masterpiece and Stringless Green Pod are heavy croppers and are recommended as good varieties. The best results have been obtained by sowing the seed in rows 30 inches apart, with the seed about 3 inches apart in the row.

BEETS.—Ten varieties were sown in the garden on May 25, and the crop taken up on October 6. The crop produced was extra heavy in both seasons. Early Model, Eclipse and Crimson Globe produced the smoothest and most uniform roots.

BEETS—TEST OF VARIETIES

Variety	Ready for use		Yield per acre				Remarks
	1921	1922	1921		1922		
			Bush.	Lbs.	Bush.	Lbs.	
Early Model	July 23	July 18	789	20	533	36	Extra good quality.
Early Wonder	" 23	" 18	741	12	385	16	Good quality.
New Dandy	" 23	.....	704	52	.....		Medium quality.
Crosby Egyptian	" 23	July 18	697	36	899	..	Good quality.
Detroit Dark Red	" 23	.....	683	04	.....		Fair quality.
Crimson Globe	" 23	July 18	668	32	638	..	Good quality.
Eclipse	" 23	" 18	566	48	939	36	Good quality; uniform size.
Extra Early	" 23	" 18	523	12	643	48	Medium quality.
Black Red Ball	" 23	" 18	486	52	385	16	Good quality.
Black Red Ball, O-245	" 23	.....	465	04	.....		Very good quality.
Cardinal Globe	"	July 18	.....		440	08	Good quality.

BEETS—THINNING EXPERIMENT.—A test was also made in thinning to two, three and four inches in the row. The variety used was Detroit Dark Red. Several years' records go to show that the best results are obtained where plants are thinned to three inches.

BEETS—THINNING EXPERIMENT

Variety	Sown	Thinned to	Ready for use	Taken up	Yield per acre				Remarks
					1921		1922		
		Inch.			Bush.	Lbs.	Bush.	Lbs.	
Detroit Dark Red	May 25	2	July 23	Oct. 7	612	04	208	48	Good crop and quality.
Detroit Dark Red	" 25	3	" 23	" 7	668	32	266	48	Good crop and quality.
Detroit Dark Red	" 25	4	" 23	" 7	588	36	269	42	Good crop and quality.

BORECOLE, OR CURLED KALE.—Dwarf Green Curled was under test in both seasons, and produced an excellent crop. Sea Kale was added to the test in 1922 and proved a good cropper of excellent quality.

BRUSSELS SPROUTS.—The varieties under test in 1922 were Dalkeith, Amager Market and Paris Market. The seed was sown in the hot-house on April 4 and the plants set out in the garden on May 31. This vegetable has never been a success at this Farm, as the sprouts seldom mature in time to miss the heavy frosts.

CABBAGE.—There were sixteen varieties of cabbage under test in 1921 and twenty-one varieties in 1922. The seed was sown in the hot-house the first week in April and the plants set in the garden on June 9. The crop in both seasons was quite satisfactory. Early Paris Market, Early Jersey Wakefield, Enkhuizen Glory and Copenhagen Market were outstanding early varieties, while, in the late sorts, Brandon Market, Marblehead Mammoth, Drumhead Savoy and Danish Red Stone Head are recommended.

CAULIFLOWER.—Two varieties, Early Snowball and Dwarf Erfurt, were sown in the hot-house on April 6, 1921, and transplanted into the garden on June 8. Both varieties were ready for use by July 16 and produced heads averaging 4½ pounds.

Owing to the extremely wet season in 1922, the crop was a failure and no results were obtained.

CELERY.—Eight varieties were under test in 1921 and seven in 1922. The seed was sown in the hot-house on March 26 and the plants set out in the garden the last week in June, in trenches 12 inches wide and 18 inches deep. Well-rotted manure was placed in the bottom of the trenches, with 6 inches of good soil on top. As the plants grow, the earth is filled in around the stalks, in order to blanch them. This method has proved the most satisfactory at this Farm. Other blanching methods tried out were planting on the level and placing 12-inch boards on edge close up to the plants; tacking tar paper to stakes close up to the plants; planting in close masses. In all cases the results obtained do not warrant a comparison with the earthing-up method.

French Success, White Plume, Winter Queen and Easy Blanching were outstanding, both in yield and quality, in both seasons.

CARROTS.—Seven varieties were under test in 1921 and nine in 1922.. The seed was sown in the garden on May 18, in both seasons, in rows 18 inches apart, with plants thinned to 2 inches apart in the row. The crop was taken up on September 29. The yield and quality were above the average.

Improved Danvers, Intermediate Chantenay and Garden Gem were outstanding in yield and quality of crop.

CARROTS—THINNING TEST.—Three plots of Chantenay were sown on May 18 and thinned to one, two and three inches apart in the row. Those thinned to one inch gave the largest yield—968 bushels and 20 pounds per acre—but the roots were unshapely, caused by crowding during growth. The two-inch thinning produced 677 bushels and 50 pounds per acre of excellent size and quality roots. Those thinned to three inches produced 581 bushels per acre of roots which, although of large size, had a large percentage split through rapid growth.

CARROTS—FALL VS. SPRING SEEDING.—This experiment was started in order to ascertain if seed sown just about freeze-up would come through the winter and produce an earlier crop than spring seeding.

Seed of Chantenay was sown on November 5, 1920, but, for some reason, very little germinated in the spring. The same results were obtained from seed sown on November 6, 1921, so that up to the present no comparison can be made.

GARDEN CORN.—Twenty-two varieties were under test in 1921 and eighteen in 1922. The seed was planted in the garden on May 29, in hills 30 inches apart each way, with four plants to the hill. The Squaw varieties were the only ones that matured for seed, while all sorts produced good cobs for use as green corn. The outstanding varieties in both seasons were Will's Early June, Evergreen Bantam, Golden Bantam and Otta (O-886-9).

CITRON.—Two varieties, Red Seeded and Citron, were under test in 1921, while Colorado and Red Citron were tested in 1922. The seed was started in the hot-house and the plants set into the garden on June 13. Red Seeded produced 43 pounds from one plant, and Citron 36 pounds. The 1922 crop set very little fruit, none of which had matured when frost came on September 10.

CUCUMBERS.—Six varieties were under test in 1921 and 1922. The 1921 crop was started in the hot-house on May 11 and the plants set into the garden on June 12. The crop produced was satisfactory. Davis Perfect, Giant Pera and Improved Long Green were outstanding varieties in yield and quality. The 1922 crop was sown in the open on May 23. The plants were late in setting fruit, so that only a fair crop was obtained before frost came on September 10.

LETTUCE.—There were eleven varieties of lettuce under test in 1921 and ten in 1922. The seed was sown in the garden, in both seasons, on May 18, in rows 18 inches apart. The cabbage, or head, sorts were thinned to six inches apart, while the loose-leaf varieties were left unthinned. The first ready for use was Earliest Wayahead, on June 15 and June 24. This variety, with Cos, Salamander and Improved Hanson is recommended in cabbage varieties, while Black Seeded Simpson and Grand Rapids lead in loose-leaf sorts.

MUSKMELON.—Extra Early Hackensack and Emerald Gem were in the test in 1921, the same two varieties, in addition to Paul Rose, a good early sort, being grown in 1922.

The seed was started in the hot-house on April 12, and the plants set in the garden on June 15. Emerald Gem produced a small crop in both seasons, while Paul Rose and Hackensack had an average crop, well ripened and of good flavour, averaging 2 pounds and 10 ounces in weight.

WATERMELON.—Two varieties, Fordhook Early and Cole's Early, were tested in 1921, and Harris Early and Cole's Early in 1922. The seed was started in the hot-house on April 23 and the plants set into the garden on June 13. Considerable fruit set in both seasons, but so late that none matured sufficiently for use.

ONIONS.—Thirteen varieties were under test in 1921 and twelve in 1922. The seed was sown in the garden on May 17, in rows 24 inches apart and the plants thinned to 3 inches apart in the row. The 1921 crop was above the average in yield and quality, while that of 1922 was poor, owing to the damage done by the root maggot, which was prevalent in all parts of the province. Prize Taker, Southport White Globe, Mammoth Silver King and Ailsa Craig were outstanding in both seasons in yield and quality.

THINNING EXPERIMENT WITH ONIONS.—This experiment has been carried on for several seasons, in order to ascertain the best distance apart to thin onions. The varieties used each season have been Large Red Wethersfield and Yellow Globe Danvers. The seed was sown in the garden on May 17, in rows 18 inches apart, and the crop was taken up on September 21. In both seasons the heaviest crop was produced from the 3-inch thinning.

GROWING ONION SETS.—As in past seasons, an experiment was carried on in growing onion sets. The seeds were sown thickly—about 225 seeds to the lineal foot—and the plants allowed to grow unthinned. The seed of Large Red Wethersfield, Yellow Globe Danvers and Extra Early Red Flat was used in this experiment. The yield and quality obtained in 1921 were extra good, while the 1922 crop was much lighter in yield but the sets obtained were very uniform in size and of excellent quality.

GROWING ONIONS FROM SETS.—This experiment has been carried on for a number of years in order to ascertain the best size of set to plant for early

onions. The varieties used were Extra Early Red, Yellow Globe, Red Wethersfield and Yellow Dutch. One-quarter, one-half and three-quarter-inch sets were planted in the garden on May 16 and the crop taken up on September 17. With all varieties, the one-quarter-inch sets produced the best crop and yield, while the three-quarter-inch sets gave a smaller yield with a considerable percentage of thick-neck. Several seasons' work with this experiment show the small sets to be the most suitable.

PARSNIPS.—Hollow Crown was tested in 1921 and XXX Guernsey in 1922. The seed was sown in the garden on May 18 and the crop taken up on October 8 and October 14. The yield for 1921 was above the average, while the 1922 crop was only medium.

PARSNIPS—THINNING EXPERIMENT.—In this experiment the Hollow Crown variety was used. The seed was sown in the garden on May 11 and the plants thinned to two, three and four inches in the row. The crop was taken up on October 8. In all cases the crop was above the average in yield and quality, the two-inch and three-inch thinning giving 1,320 bushels per acre and the four-inch yielding 1,424 bushels and 16 pounds per acre.

PARSLEY.—The varieties under test in 1921 were Champion Moss Curled and Triple Curled, with the same two varieties, in addition to Double Curled, in 1922. The seed was sown in the garden on May 18 and was ready for use by August 10. The crop was equally good from the three varieties.

PUMPKINS.—Three varieties were tested in 1921 and four in 1922. The seed was started in the hothouse on May 11 and the plants set into the garden on June 13. The 1921 crop was good in yield and quality, while the 1922 crop was only medium and so late that none matured for use. Connecticut Field, King of Mammoth and Small Sugar are recommended as suitable varieties.

PEPPER.—Harris Earliest was under test in 1921 and Small Red Chile in 1922. The seed was sown in the hot-house on April 12 and the plants transplanted into the garden on June 27. Very little ripened in either seasons, but a large crop of green fruit was produced from both varieties.

GARDEN PEAS.—Twenty varieties of garden peas were tested in 1921 and thirteen varieties in 1922. The seed was sown in the garden on May 26, in rows 50 feet long and 30 inches apart in the row. The first picking was made on July 7, in each season, from Little Marvel, an early variety which produced good yields. The other outstanding varieties for both seasons are Gregory Surprise, McLean Advancer 0-167-8, Gradus and Eldorado.

POTATOES.—Thirty-one varieties were under test in 1921 and twenty-nine varieties in 1922. The seed was planted in uniform test rows, 100 feet in length, rows 30 inches apart, and the seed 12 inches apart in the row. The crop was given several cultivations and hilled up the first week in July. Potato bugs were in evidence, in both seasons, but were easily controlled by one spraying with arsenate of lead in the proportion of 2 pounds to 40 gallons of water.

The following table gives the results of the two seasons' tests:—

POTATOES—TEST OF VARIETIES

Variety	Form	Colour	Yield per acre marketable				Average yield two years	
			1921		1922			
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Houlton Rose	Oval	Red	339	18	388	36	363	57
New London	Long	Red	292	54	420	30	356	42
Irish Cobbler (Rosthern)	Round	White	371	12	301	36	336	24
Vick Extra Early	Long	Pink and white.	284	12	348	..	316	..
New Queen	Oval	Pink and white.	337	42	205	54	310	40
Early Bovee	Long	Pink and white.	301	36	319	..	310	..
Wee Macgregor	Oval	White	307	24	307	24	307	24
Bermuda Early	Oval	Red	236	08	342	12	289	10
Early Hebron	Oval	Pink and white.	307	24	255	12	281	18
Rawling Kidney	Long	White	350	54	212	56	275	35
Green Mountain	Round	White	281	18	263	54	272	36
Manitoba Wonder	Long	Pink	240	42	301	36	270	24
Money Maker	Long	White	243	36	295	48	269	42
Irish Cobbler	Round	White	269	42	266	..	267	30
Late Puritan	Oval	White	304	30	226	12	265	21
Eureka Extra Early	Oval	White	266	48	263	..	264	30
Early Norther	Oval	Pink	307	24	220	24	263	24
King George	Round	White	246	30	281	18	263	54
Carman No. 1	Oval	White	246	30	261	..	253	15
Table Talk	Long	White	232	..	266	48	249	24
Morgan Seedling	Round	Pink	313	12	168	12	240	42
Empire State	Long	White	258	06	142	06	200	06
Early Six Weeks	Round	Red	188	30	197	12	192	51
Gold Nugget (Wheeler)	Oval	White	258	06	116	..	187	03
Dalmeny Beauty	Flat	White	287	06	87	..	187	03
Everett	Oval	White	176	54	150	48	163	43
White Star	Oval	White	330	30				
Vermont Gold Coin	Round	White	321	54				
Dreer Standard	Round	White	319	..				
Early Ohio	Long	Red	261	..				
King Seedling	Oval	White	200	06				

POTATOES—CULTURAL EXPERIMENTS

Variety	Nature of Experiment	Yield of marketable potatoes			
		1921		1922	
		Bush.	Lbs.	Bush.	Lbs.
Early Ohio	Rows 36 in. apart; sets 12 in. apart in row	293	20	216	..
Early Ohio	Rows 36 in. apart; sets 14 in. apart in row	293	20	215	40
Early Ohio	Rows 30 in. apart; sets 14 in. apart in row	243	20	217	20
Early Ohio	Rows 30 in. apart; sets 12 in. apart in row	223	20	214	..
Early Ohio	Cultivated twice and hilled	213	20	244	..
Early Ohio	Flat cultivation	266	40	243	20
Early Ohio	Cultivated three times and hilled	263	20	246	20
Early Ohio	Cultivated six times and hilled	250	..	252	..

POTATOES (EXPERIMENT IN SPROUTING SEED BEFORE PLANTING).—For this experiment whole potatoes, averaging about three ounces, are placed in shallow boxes and exposed to the sunlight until the sprouts are from 2½ to 3 inches in length. The seed should be planted uncut, leaving the sprout just showing above ground. Increased yield and earliness recommend this plan where a small plot is desired.

COMPARISON OF SPROUTED AND UNSPROUTED SEED—1922

Variety	Yield per acre				Average yield per acre 5 years			
	Sprouted		Unsprouted		Sprouted		Unsprouted	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Vick Extra Early	678	36	284	12	615	58	306	33
Early Bovee	417	36	301	36	372	14	319	27
King Seedling	411	48	200	06	350	27	272	18

COST OF GROWING POTATOES.—This experiment has been carried on for several years, in order to ascertain the exact cost of growing potatoes under existing conditions. An exact record was kept of the labour on a one-acre plot from the time of planting to storing for winter. The average cost of labour, including cost of seed and rent of land, for 1921 and 1922 amounted to $88.13. The average yield for the two seasons was 246 bushels and 30 pounds of marketable potatoes, which brought the cost to 35·68 cents per bushel. The average cost of production, over a five-year period, has been 29·4 cents per bushel.

A walking plough was used to open up the drills, while a modern potato digger is used to lift the crop. The variety used in this test was Early Ohio, which is one of the best main-crop varieties for this part of the province.

RADISH.—Two varieties, Scarlet Turnip White Tip and White Icicle, were under test in 1921, the same sorts, in addition to Scarlet Olive, being tested in 1922. The seed was sown in the garden on May 18 in both seasons and the first was ready for use on June 15. Scarlet Turnip White Tip and White Icicle are outstanding varieties every season. Scarlet Olive was under test for the first time this season and was below the average in yield and quality.

RHUBARB.—The varieties at present under test are Tobolsk, Victoria and Strawberry. Victoria and Strawberry are recommended as suitable varieties for western planting. Tobolsk, while a heavy producer, is coarser in texture and inclined to be somewhat stringy.

Winter forcing of rhubarb.—For a number of seasons, a test has been carried on in growing rhubarb in the cellar during the winter months. Twelve roots are taken up just before freeze-up and allowed to freeze solidly before placing in the cellar in some dark corner where the temperature will run from 40 to 45 degrees. The roots are filled in with earth, covered with straw and well watered, and should be kept damp by occasional sprinkling. The stalks will be almost white and very tender. Roots that are taken in and not allowed to freeze will be almost dormant and produce a very small crop.

KOHL RABI.—Three varieties were in the test in 1921 and two in 1922. The seed was sown in the garden on May 19 and the crop taken up on September 25. The yield was good in both seasons, but the quality was only medium, the roots, in all cases, being rather coarse and woody. Early Purple and Long Green Vienna are the best yet tested here.

SALSIFY.—Long White was under test in 1921 and the same variety, with Sandwich Island, in 1922. The seed was sown in the garden on May 19, in rows 18 inches apart. The roots were ready for use by October 8. Long White is the heaviest producer yet tested here, but, like all other varieties, has too many side shoots.

SPINACH.—Carter Victoria and New Zealand were the varieties under test. The seed was sown in the garden on May 19 and was ready for use on June 23. Victoria produces the earliest crop, while New Zealand is somewhat later but produced a very heavy yield of good quality.

SQUASH.—Four varieties were under test in 1921 and five in 1922. The 1921 crop was started in the hothouse on May 11 and the plants set in the garden on June 12. English Vegetable Marrow, Golden Hubbard, Delicious and Long White Bush marrow produced heavy yields of well-matured squash. The 1922 crop was planted in the garden on June 6, but was late in setting fruit and none was mature when frost came on September 10.

GARDEN TURNIPS.—Golden Ball, Early Snowball, Extra Early Purple Milan and Red Top Strap Leaf were under test in 1921 and 1922. The seed was sown in the garden on May 19, in rows 30 inches apart and the plants thinned to 5 inches apart in the row. The roots were ready for use by July 19. Golden Ball and Red Top Strap Leaf were outstanding in yield and quality.

TOMATOES.—Sixteen varieties were under test in 1921 and eight in 1922. The seed was sown in the hot-house on March 28 and the plants set in the garden on June 12. The 1921 crop matured ripe fruit from all varieties, while the 1922 crop was late and only a small percentage ripened. The largest yield of green fruit was obtained from plants left unpruned, while the largest amount of ripe fruit came from plants trimmed to two stalks with one-half the foliage removed. Alacrity (0-704), Burbank Early (0-732) and John Baer were outstanding varieties in both seasons.

TOMATOES (PRUNING TESTS).—Two varieties, Bonny Best and Alacrity, were used in this test. The weights are taken from ten plants set 2 feet apart in the row and rows 4 feet apart. The unpruned plants produced a heavy crop of green fruit, about 87 per cent of which ripened before frost same. The plants pruned to one and two stems and with foliage partly removed ripened about 50 per cent of the crop.

The following table gives the methods used and the yield of fruit produced from ten plants.

TOMATOES—CULTURAL METHODS

Variety	Method	First ripe	Weight of fruit. Two-year average		Total weight of fruit. Two-year average
			Ripe	Green	
			Lbs.	Lbs.	Lbs.
Alacrity	Unpruned	July 7	25	214	239
Bonny Best	Unpruned	" 7	32½	153½	186
Alacrity	One stem tied to stake	" 7	52¼	79	129¼
Bonny Best	One stem tied to stake	" 7	38	43½	81½
Alacrity	Two stems tied to wire	" 7	71	51½	122½
Bonny Best	Two stems tied to wire	" 7	50	54	104
Alacrity	Foliage to remain	" 7	69	44½	113½
Bonny Best	Foliage to remain	" 7	48½	51	99½
Alacrity	One-half foliage removed	" 7	68	31	99
Bonny Best	One-half foliage removed	" 7	48	44	92
Alacrity	Transplanted to 10 in. pots	" 7	81	34	115
Bonny Best	Transplanted to 10 in. pots	" 7	76½	49	125½

FRUITS

APPLES

Little, or no, success can yet be reported with standard apples at this Farm. A number of varieties have been tried, but they winter-killed before fruit was produced. Cross-bred varieties are perfectly hardy and produced good crops of fruit about the size of a crab. Eve, Columbia, Prince, Jewel and Tony are good varieties, the fruit of which is good for preserving, while many of the smaller sorts make very good jelly. In 1912 several thousand standard

apple seedlings were set out in nursery rows in the hope that at least a few might produce apples worth while. Although several have fruited, none are much larger than a crab, but there is still a chance of some good fruit being produced from this plantation. While these seedlings killed back for a number of winters, they are now perfectly hardy.

PLUMS

In 1921 all the plums gave heavy yields and some very good fruit was produced from Hansen's cross-bred sorts, and also from selections of the native variety. In cross-bred sorts, the heaviest yields and best quality fruit were from Topa, Owanka, Winnipeg, Wastesa, Opata and Assiniboine. The Assiniboine, a selection of the Manitoba wild plum, has given excellent yields in past seasons, and has been used for budding wild seedlings, with good results. The 1922 plum crop promised fairly up till June 22, when a hail storm visited the Farm and practically destroyed all fruit.

STRAWBERRIES

Heavy rains during the fruiting season in 1921, and hail in 1922, severely damaged the strawberry beds and the crops obtained were almost worthless. Beder Wood and Senator Dunlap have given excellent results here, and can be recommended as suitable varieties.

The everbearing varieties, Americus, Progressive and Superb, produced some fruit in both seasons, and, from observations made, will, undoubtedly, prove a valuable addition to our small fruits.

RASPBERRIES

Six varieties of raspberries are under test in the plantation. All are given winter protection, and come through in good condition. The bushes are trimmed down each fall to from three to four good strong canes of the new growth, which are laid over and covered with earth about six inches deep. The canes came into bloom on May 25, in both 1921 and 1922, and the first picking was made on July 10. The 1921 crop was above the average in yield, while the 1922 crop was very light, due to hail damage on June 22. Sunbeam is the hardiest variety, and a consistent yielder, although the fruit is rather small, being slightly larger than wild fruit. Weights are kept from the twenty-four plants of each sort, but are not what are actually produced, as birds secure at least one-half the crop. Herbert, Ohta and Early King produce a large, firm berry, and are very good yielders. Golden Queen is a white variety, producing large fruit, but gives very light yields.

GOOSEBERRIES

Five varieties of gooseberries are at present under test in the small fruit plantation. There are twelve bushes of each variety. These appear to be equally hardy and came through the winters in good condition. The bushes came into bloom on May 25 and a medium crop of fruit set. The crop was attacked by a fruit fly (*Epochra canadensis*), which deposits its eggs in the green berry, causing it prematurely to ripen and drop off. From information received from the Entomological Branch, Ottawa, the control of this pest is expected in future seasons. Varieties recommended are Smith Improved, Houghton and Downing.

RED CURRANTS

There are eight varieties of red currants in the plantation, six bushes of each being under test. The first bloom was observed on May 24, in both years. All set a medium crop of fruit, which was practically ruined by birds and

insects in 1921 and by hail in 1922. Varieties recommended are Victoria Red, Rankin Red, Red Grape and Red Dutch.

WHITE CURRANTS

Six varieties, six bushes of each, are in the plantation. A medium crop of fruit was set by June 10, each season, which was badly damaged by insects and hail. Recommended varieties are White Cherry, Verriere's White and White Grape.

BLACK CURRANTS

Twelve varieties, six bushes of each, are in the plantation. The first bloom was noted on May 24, and fruit had set by June 4. The crop obtained was below the average in yield and quality. Recommended varieties are Dominion, Saunders, Climax, Collins Prolific, Topsy and Magnus.

ORNAMENTAL GARDENING

At the present time there are fifty-seven species of trees and shrubs in the arboretum that are perfectly hardy and suitable for this climate, while a number are only half-hardy and kill back more or less each winter. The following list will be useful as a guide to those contemplating setting out ornamental trees and wind-breaks.

Deciduous trees—

Native Elm *(Ulmus americana)*
Native Maple *(Acer Negundo)*
Basswood *(Tilia americana)*
Cottonwood *(Populus deltoidea)*
Balsam Poplar *(Populus balsamifera)*
Russian Poplar *(Populus Wobstii)*
Red Ash *(Fraxinus pennsylvanica)*
Native Ash *(Fraxinus pennsylvanica lanceolata)*
Paper Birch *(Betula papyrifera)*
Cut-leaved Birch *(Betula laciniata pendula)*
Low Birch *(Betula pumila)*
Silver Poplar *(Populus alba)*
Hackberry *(Celtis occidentalis)*
Mountain Ash *(Pyrus americana)*
Mossy Cup Oak *(Quercus macro carpa)*

Coniferous trees—

White Spruce *(Picea canadensis)*
Balsam Fir (Abies balsamea)
Norway Spruce *(Picea excelsa)*
Black Spruce *(Picea mariana)*
Blue Spruce *(Picea pungens)*
Scotch Pine *(Pinus sylvestris)*
Banksian Pine *(Pinus banksiana)*
Stone Pine *(Pinus Cembra)*
Mountain Pine *(Pinus montana)*
White Cedar *(Thuya occidentalis)*
Golden Cedar *(Thuya occidentalis aurea)*
Pyramid Cedar *(Thuya occidentalis pyramidalis)*
Larch *(Larix pendula)*

Ornamental shrubs—

Caragana *(Caragana arborescens)*
Caragana *(Caragana pygmœa)*
Woody Caragana *(Caragana frutescens)*
Lilac *(Syringa vulgaris)*, 32 varieties
Lilac *(Syringa villosa)*
Japan Lilac *(Syringa japonica)*
Spiræa *(Spiræa arguta)*
Prunus tomentosa
High-bush Cranberry *(Viburnum Opulus)*
Sheep Berry *(Viburnum Lentago)*
Dogwood *(Cornus alba)*
Cotoneaster *(Cotoneaster integerrima)*
Scarlet Haw *(Crataegus coccinea)*
Western Haw *(Crataegus Douglasii)*
Broom *(Cytisus biflorus)*
Honeysuckle *(Lonicera Alberti)*
Honeysuckle *(Lonicera bella candida)*
Mock Orange *(Philadelphus coronarius)*.

SAMPLE HEDGES

There are now twenty-five species of trees and shrubs grown in the arboretum in hedge rows. These are kept trimmed down to various heights in order to show their suitability for this purpose. Since last report, several of the Buckthorns and Spiræas have been removed, as they were found unsuitable for this work. For a high, close shelter hedge of the Blue Spruce (*Picea pungens*) and Balsam Fir (*Abies balsamea*) can be highly recommended. In fact, any of the hardy coniferous trees are quite suitable, as they grow rapidly and are ornamental, and a protection both in summer and winter.

Deciduous trees recommended are Native Maple, Native Chokecherry, Native Ash, Lilac, Dogwood, Hackberry and Hawthorn.

For low ornamental hedging, Caragana, Dwarf Caragana, Cotoneaster and Dogwood.

PERENNIAL FLOWERS

The perennial beds came through the winter in good condition, only the Sweet William and some Iris being partly injured. The beds were cleared of stalks in early October and a good coating of stable manure placed on them the last week in November. The strawy part of this covering is removed in the spring and the beds lightly dug over early in May. This has been found the best method to keep the beds in a thrifty condition.

Outstanding varieties this season were Pæonies, Aquilegia, German Iris, Delphinium, Oriental Poppy, Bleeding Heart, Hemerocallis, Scarlet Lychnis, Pyrethrum, Helianthus, Rudbeckia and Achillea.

ANNUAL FLOWERS—1922

Seventy varieties of annual flowers were under test this season and made a very fine showing until September 10, when all were cut down by a severe frost. The seed of most varieties was sown in the hothouse and transplanted into the garden when danger from frost was past.

Asters were not a success, owing to an attack of rust which greatly reduced the amount of bloom. Sweet peas were late in blooming, but came on remarkably well during the latter part of July and August.

Outstanding varieties were Verbena, Stocks, Petunia, Annual Larkspur, Lavatera, Antirrhinum (seven varieties), Salvia, Dahlia, Zinnia and Sweet Pea (sixty named varieties).

BULBS—1922

Tulips.—Twenty-one varieties of single tulips and four varieties of double tulips, comprising 3,000 bulbs, were planted on October 20, 1921. These came through the winter in good condition and made a very fine display during the latter part of May and early June.

Some of the best single varieties were Artus, Duchesse de Parma, Crimson King, Goldfinch, Queen of the Netherlands, Flamingo, Pottebakker and Pink Beauty. In early double varieties, William 3rd, Murillo and Imperator Rubrorum are to be recommended.

Narcissus.—Narcissus cannot be recommended for out-of-doors planting, as they nearly always rot when planted in the fall.

Scilla.—Scillas are very hardy and are the first flower to come into bloom shortly after the snow has gone. These should be planted in clumps where they may remain permanently, as, once established, they will bloom for years.

CEREALS

The results obtained from six cereal projects during 1921 and 1922 are summarized below in short, comprehensive tables. These projects consisted of tests of varieties or strains of common spring wheat, oats, barley, field peas, flax and winter rye. The differences in season produced marked contrasts in yield and character of cereal crops on this Farm. The averages covering a longer period of years are given to convey a more accurate idea of the relative value of the different varieties. The statistical evidence recorded in the following tables is not only of interest to the student of agriculture, but is of economic importance to the farmers in southern Saskatchewan.

WHEAT

Compared with 1921, the season of 1922 was decidedly superior for wheat production in this district. In 1922, on fallow, the varieties took two days longer to mature, producing straw which averaged three and one-half inches longer. In the same year, on stubble, six days more than in 1921 were required to ripen the crop, but the straw averaged one-half inch shorter. The differences in strength of straw were very slight. An average increase of twenty-two and one-half bushels on fallow and ten and one-half bushels on stubble was recorded in 1922. With that superiority in yield, there was also an increase of ten and twelve pounds in weight per bushel for fallow and stubble, respectively. The seasonal notes at the beginning of this report will explain these differences to a great extent. Averages for these two years are given in the following tables. While these tables indicate value of certain varieties, the six-year averages are a more reliable guide to wheat varieties for this district.

COMMON SPRING WHEAT—FALLOW—TEST OF VARIETIES OR STRAINS. AVERAGE 1921-22

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Garnet, O. 652	99·5	38·25	10·0	41	40	56·25
Marquis (Chemist)	109·5	41·5	7·5	40	40	57·75
Crown, O. 353	104·0	40·5	10·0	37	50	55·0
Marquis	109·25	44·7	9·25	36	43	59·25
Kitchener	105·0	48·75	8·5	35	10	53·5
Kota, C. J	108·5	41·5	6·0	35	..	59·5
Red Fife	108·5	44·5	8·5	32	..	57·75
Major, O. 522	100·0	46·75	10·0	31	40	54·75
Ruby	94·0	38·5	7·5	29	20	58·25
Master	102·0	34·0	6·0	23	20	55·5
Prelude	97·0	35·5	6·0	21	40	59·25

COMMON SPRING WHEAT—STUBBLE—TEST OF VARIETIES OR STRAINS. AVERAGE 1921-22

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Red Bobs	96·5	41·75	7·5	29	40	57·5
Ruby	92·0	41·5	6·0	28	..	57·75
Red Fife	107·5	44·5	10·0	27	20	57·0
Kitchener	105·0	45·0	10·0	26	50	54·0
Marquis	104·1	41·5	7·4	25	40	55·0
Garnet, O. 652	94·5	36·0	7·5	25	..	56·25
Crown, O. 353	100·5	39·25	8·5	24	10	54·75
Major, O. 522	91·5	45·25	10·0	23	05	53·75
Master, O. 520	98·5	34·0	6·0	19	..	55·25
Prelude	95·5	34·0	7·0	16	40	58·0

COMMON SPRING WHEAT—FALLOW—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917-1922

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Marquis	108·25	33·4	8·5	42	16	61·25
Red Fife	112·7	40·8	8·7	37	13	60·1
Ruby	97·8	41·3	8·5	31	10	61·1
Prelude	98·7	32·8	7·3	22	40	61·5

COMMON SPRING WHEAT—STUBBLE—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917-1922

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Red Fife	113·5	36·5	9·1	28	27	61·5
Marquis	106·6	35·7	6·9	27	46	62·6
Ruby	100·3	32·0	6·5	25	58	62·2
Prelude	97·8	31·0	7·3	20	43	61·8

OATS

The season of 1922 was more favourable than 1921 for oat production in this district. There was an increased yield, with long, clean straw, and the crop matured some ten days earlier. There was little difference in the order of merit for the varieties when the results for both years are compared. In 1922, Banner oats had a commanding lead over the variety taking second place. An improved strain of the variety was responsible for the change. This illustrates the importance of good seed in grain production. The later-maturing varieties are superior, in this area, in yield and quality. The comparatively low yield of Liberty in all cases is accounted for by the fact that it is a hulless variety. The newer varieties of oats do not promise as well as the newer varieties of other grains.

OATS—FALLOW—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921-22

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Danish Island	105·5	45·5	8·5	113	27	38·0
Banner	102·5	47·5	7·5	112	31	36·8
Gold Rain	103·0	48·5	7·5	104	27	38·8
Victory	102·5	45·5	9·0	99	22	40·5
Leader	101·0	45·75	8·8	96	33	33·8
O.A.C. 72	104·0	48·0	7·5	93	25	38·8
Longfellow	97·0	50·0	10·0	91	03	36·0
Daubeney	89·5	40·0	7·0	85	25	35·25
Alaska	91·5	41·5	8·5	71	21	37·8
Liberty (Hulless)	101·0	46·5	8·5	53	11	47·5

OATS—STUBBLE—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921-22

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Banner	103·8	45·8	7·0	101	18	38·0
Danish Island	101·5	46·75	7·8	94	18	38·5
Leader	101·0	40·0	10·0	85	33	35·1
O.A.C. 72	102·5	44·3	7·0	81	18	38·7
Longfellow	96·0	46·1	10·0	78	07	36·1
Gold Rain	101·2	42·0	7·0	76	12	41·1
Daubeney	86·0	35·5	7·0	68	22	34·3
Victory	104·5	38·75	9·3	62	27	40·6
Alaska	86·5	38·5	8·5	59	13	38·3
Liberty (Hulless)	98·5	38·1	8·5	42	12	46·3

OATS—FALLOW—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917-1922

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Danish Island	103·5	40·7	8·5	108	19	38·3
Victory	100·5	40·0	9·5	104	06	41·1
Gold Rain	103·7	42·0	8·7	102	10	40·8
Banner	102·0	40·1	8·2	101	19	38·8
O.A.C. 72	103·7	42·5	8·7	97	27	38·3
Daubeney	95·0	36·7	7·8	82	18	36·3
Liberty (Hulless)	102·7	35·9	8·7	61	25	49·8

OATS—STUBBLE—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917-1922

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Danish Island	101·8	40·4	8·6	81	07	38·8
O.A.C. 72	103·7	42·3	8·5	80	29	38·2
Gold Rain	102·0	36·7	8·0	75	32	41·8
Banner	103·7	36·8	8·0	73	19	37·7
Victory	104·5	35·1	9·4	63	10	41·3
Daubeney	96·7	32·3	8·5	57	15	36·2
Liberty (Hulless)	101·8	35·7	8·2	46	12	49·0

BARLEY

As in the case of wheat and oats, 1922 was better than the previous year for the production of barley. In 1921, varieties were later and had more straw of better quality; but the latter year produced higher yields, with grain of superior quality. Some new names appear in these tables. Himalayan and Junior are hulless sorts. Success and Feeder are hooded varieties. Albert is a six-rowed early variety, with a very brittle straw causing a great loss of heads. It will be noted that some of the new varieties promise advancement over present standard sorts of barley.

BARLEY—FALLOW—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921-22

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Chinese, O. 60	89·0	42·0	8·5	71	12	50·25
Charlottetown 80	101·5	38·0	7·5	70	..	51·5
Himalayan, O. 59	90·0	31·0	6·0	67	44	61·0
Stella	92·0	42·5	7·0	67	44	48·8
Bearer, O. 475	96·0	44·5	7·5	66	12	46·8
O.A.C. 21	90·0	42·7	8·5	65	30	48·25
Junior, O. 471	90·5	29·5	6·0	62	24	60·9
Duckbill	94·0	38·5	10·0	61	32	50·8
Success	79·5	37·3	8·5	50	..	49·5
Feeder, O. 561	84·0	42·3	8·5	47	04	55·0
Albert	81·0	36·3	6·0	39	23	46·5

BARLEY—STUBBLE—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921-1922

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Charlottetown 80	98·0	33·0	6·0	51	32	51·3
Stella	87·0	39·3	7·0	50	35	48·0
Chinese, O. 60	86·5	35·0	8·5	50	..	49·8
Bearer, O. 475	93·5	33·5	7·5	49	08	47·0
Himalayan, O. 59	84·5	26·5	7·0	45	40	61·8
Duckbill	95·5	34·5	10·0	43	16	50·5
Junior, O. 471	84·5	25·5	6·0	43	10	61·8
Feeder, O. 561	83·5	39·3	8·5	37	24	51·3
O.A.C. 21	90·0	37·7	9·3	35	28	48·0
Success	79·0	33·0	8·5	35	08	49·0
Albert	80·5	33·3	7·0	30	40	46·8

BARLEY—FALLOW—TEST OF VARIETIES OR STRAINS.—SIX-YEAR AVERAGE, 1921-1922

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.t
Stella	91·8	34·25	8·3	57	43	47·8
O.A.C. 21	88·3	35·9	8·3	55	43	45·6
Charlottetown 80	100·3	32·0	7·5	55	09	50·09
Albert	86·7	31·6	7·2	30	13	44·9
Success	82·8	32·8	8·0	29	35	46·8

BARLEY—STUBBLE—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917-1922

Variety	Days to matnre	Length of straw	Strength of straw on a scale of 10 points	Yield per acre		Weight per measured bushel
		inch		bush.	lb.	lb.
Charlottetown 80	100·3	27·2	7·0	40	37	50·9
Stella	91·5	29·25	8·3	38	34	46·3
O.A.C. 21	94·5	29·6	9·1	32	37	45·5
Success	84·3	29·2	8·0	24	05	46·5
Albert	84·5	29·0	8·5	21	47	45·6

PEAS

Unlike the grains in the foregoing projects, peas produced a greater yield in 1921 than in 1922. The seasonal fluctuations in this district are not enough to affect seriously the yield of field peas. In other words, peas is a sure crop which is receiving more prominence. The extensive production of peas is not practised because of lack of suitable machinery for handling a large crop. Of the varieties under test, Mackay has again demonstrated its superiority over the others grown; and this superiority is still further emphasized by its standing in the six-year average.

PEAS—FALLOW.—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921–22

Variety	Days to mature	Length of vine	Yield per acre		Weight per measured bushel
		Inch	Bush.	Lbs.	Lbs.
Golden Vine	102·0	45·5	34	10	63·0
Mackay, O. 25	101·0	43·5	34	0	63·3
Chancellor D	93·0	44·0	33	0	63·8
Arthur	101·5	47·0	30	30	63·3
Champlain	101·5	41·5	27	0	63·8
Cartier	102·0	39·0	26	30	63·5

PEAS—STUBBLE.—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921–22

Variety	Days to mature	Length of vine	Yield per acre		Weight per measured bushel
		Inch	Bush.	Lbs.	Lbs.
Mackay	101·5	48·5	36	20	63·1
Arthur	100·5	46·5	32	40	64·8
Golden Vine	100·0	44·0	31	40	64·0
Champlain	101·5	43·5	30	50	63·3
Chancellor D	91·5	41·0	28	0	63·8

PEAS—FALLOW.—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917–1922

Variety	Days to mature	Length of vine	Yield per acre		Weight per measured bushel
		Inch	Bush.	Lbs.	Lbs.
Mackay	111·7	45·3	37	40	63·1
Golden Vine	111·0	38·7	37	07	62·3
Arthur	94·1	39·2	35	0	63·8

PEAS—STUBBLE.—TEST OF VARIETIES OR STRAINS. SIX-YEAR AVERAGE, 1917–1922

Variety	Days to mature	Length of vine	Yield per acre		Weight per measured bushel
		Inch	Bush.	Lbs.	Lbs.
Mackay	111·2	45·8	34	43	63·2
Golden Vine	110·5	37·2	29	26	64·2
Arthur	100·3	37·0	28	33	64·4

FLAX.

Fifty per cent higher yields of flax seed were obtained in variety tests at this Farm in 1921 than in 1922. The relation of frost to this crop is well known. Earliness is a very important factor. The later maturing varieties, such as Longstem, should be avoided. Over a period of six years, Premost, which is the earliest, has a distinct advantage over Novelty.

FLAX—FALLOW.—TEST OF VARIETIES OR STRAINS. AVERAGE, 1921-22

Variety	Days to mature	Length of straw	Yield per acre	Weight per measured bushel
		Inch	Bush. Lbs.	Lbs.
Novelty	102	35·5	23 44·0	53·25
Premost	93	32·0	23 22·0	33·5
Longstem	106	38·5	15 39·5	52·5

FLAX—FALLOW.—TEST OF VARIETIES OR STRAINS. FOUR-YEAR AVERAGE, 1919-1922

Variety	Days to mature	Length of straw	Yield per acre	Weight per measured bushel
		Inch	Bush. Lbs.	Lbs.
Premost	91·3	25·0	24 37	56
Novelty	98·5	26·6	22 03	54

WINTER RYE

Winter, or fall, rye is becoming a more successful crop in this district. Varieties show small differences. The time required for maturity is not the important consideration; hardiness is the main factor. In the early history of this Farm winter rye was very uncertain. In recent years, a successful crop is harvested in nine out of ten seasons. The following tables give the results for 1921 and an average for three years.

WINTER RYE.—TEST OF VARIETIES OR STRAINS, 1921

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre	Weight per measured bushel
		Inch		Bush. Lbs.	Lbs.
Common	313	48	7	49 24	54·5
Saskatchewan	308	52	10	44 16	54·5
No. 959	310	46	10	41 24	55·0

WINTER RYE.—TEST OF VARIETIES OR STRAINS. THREE-YEAR AVERAGE, 1919-1921

Variety	Days to mature	Length of straw	Strength of straw on a scale of 10 points	Yield per acre	Weight per measured bushel
		Inch		Bush. Lbs.	Lbs.
Common	336	47·0	8	37 28	55·1
No. 959	335	46·5	9	35 20	55·1
Saskatchewan	334·3	51·6	6	29 13·6	55·3

FORAGE CROPS

During the seasons of 1921 and 1922 all forage crop projects conducted at this Farm gave satisfactory results. One-hundredth acre plots were used in this work. These were duplicated in all cases except the grasses, where triplicate plots were used. Summer-fallowed land was used for tests of corn, field roots and sunflowers.

ENSILAGE CORN

During these years many of the corn varieties under test matured sufficiently to make a good quality of ensilage. Varieties which did not reach this stage may be regarded as being too late to be of greatest value for this purpose.

ENSILAGE CORN.—TEST OF VARIETIES

Variety	Average height	Stage of maturity	Average yield per acre	
	Inch		Tons	Lbs.
Wisconsin No. 7	98	Cobs	22	1,500
Compton's Early	85	Cobs	20	1,000
Silver King	72	Firm cobs	20	300
North Dakota	92	Soft	20	300
Longfellow	88	Soft	19	500
Improved Leaming	100	Cobs	19	300
White Cap Yellow Dent	78	Flower	19	0
Disco Pride Yellow Dent	81	Cobs	19	0
River View Special	80	Firm Cobs	19	0
Longfellow Yellow Flint	80	Cobs	18	1,800
North West Red Dent	79	Cobs	18	300
Wisconsin No. 7	94	Cobs	17	1,000
Golden Glow	93	Cobs	17	500
Red Cob	70	Cobs	17	500
Ninety-Day White Dent	91	Soft	17	300
Disco White Flint	84	Cobs	16	1,500
Disco Yellow Flint	65	Cobs	16	300
Commercial Dent	73	Cobs	16	0
Bailey	84	Soft cobs	15	1,300
Golden Dent	76	Cobs	15	1,200
Early Murdock	100	Firm Cobs	15	300
Minnesota 13	82	Cobs	15	300
Leaming	90	Cobs	15	200
King Phillip Red Flint	73	Cobs	15	0

ENSILAGE CORN.—TEST OF VARIETIES. AVERAGE, 1921-22

Variety	Average height	Average yield		Maturity	
				1921	1922
	Inch	Tons	Lbs.		
Leaming	87·5	19	425	Late dough	Milk stage
Longfellow	84·0	17	600	Late dough	Milk stage
North West Red Dent	77·6	17	600	Late dough	Early dough
Minnesota No. 13	81·5	17	450	Ripe	Early dough
Disco Yellow Flint	64·0	17	50	Ripe	Early dough
Disco 90-Day White Dent	80·0	15	1,550	Ripe	Early dough

ENSILAGE CORN.—TEST OF VARIETIES. THREE-YEAR AVERAGE, 1920–22

Variety	Height	Yield per acre
	Inch	Tons Lbs.
Leaming	80·3	19 1,100
Longfellow	73·3	14 683
North West Dent	71·7	13 1,550
Minnesota No. 13	71·3	14 533

FIELD ROOTS

Satisfactory yields were obtained from field roots in 1921 and 1922. Seeding was done during the third week of May and the crop was harvested during the second week of October. Rows, thirty inches apart, were used. When the third set of true leaves appeared, the mangels and turnips were thinned to nine inches apart in the row and the carrots to three inches. Frequent cultivations were given during the growing season. The yields, together with some notes on the varieties, are set forth in the following tables:—

MANGELS—TEST OF VARIETIES. AVERAGE, 1921–22

Variety	Source of Seed	Yield	Remarks
		Tons Lbs.	
Prize Taker Yellow Globe.	McKenzie Seed Co.	32 1,550	Fairly uniform globe type. Colour varies from orange to lemon.
Eclipse	McKenzie Seed Co.	30 50	Varies in shape, with tankard predominating. Fairly true in colour.
Peerless	McKenzie Seed Co.	29 750	Varies slightly in colour, with types from intermediate to long.
Giant White Sugar	Steele, Briggs Seed Co.	28 400	Variations in shape, with fairly uniform colour.
Giant Yellow Globe	Steele, Briggs Seed Co.	27 400	Orange to lemon in colour, with reasonable uniformity in type.
Yellow Intermediate	McKenzie Seed Co.	26 1,500	Oval to oblong in type, with fairly uniform colour.
Royal Giant	Steele, Briggs Seed Co.	26 650	Colour varies, with fairly uniform type.
Golden Tankard	McKenzie Seed Co.	26 250	Uniform in colour; mostly oval in shape.
Giant Long Red	McKenzie Seed Co.	25 1,050	True in colour; many branching roots; hard to harvest.
Giant Yellow Oval	Steele, Briggs Seed Co.	23 1,300	Varies slightly in type and colour.
Prize Mammoth Long Red.	Steele, Briggs Seed Co.	23 250	Lacks uniformity; roots smaller than average.

FIELD CARROTS—TEST OF VARIETIES, 1921

Variety	Source of Seed	Yield per acre	Remarks
		Tons Lbs.	
Improved Short White.	Steele, Briggs Seed Co.	19 700	Fairly true in colour, but variable in shape from intermediate to short.
Long White Belgian	Steele, Briggs Seed Co.	16 200	True in colour, but too long a root to harvest easily.
Long Orange	Steele, Briggs Seed Co.	13 500	True in colour and fairly true in type; too long to harvest easily.
Oxheart	Steele, Briggs Seed Co.	12 700	Uniform in colour and type; very easily harvested and a good type of root.

FIELD CARROTS—TEST OF VARIETIES, 1922

Variety	Source of Seed	Yield per acre	Remarks
		Tons Lbs.	
Improved Short White.	Steele, Briggs Seed Co.	13 1,700	Good type and fairly uniform.
Mammoth White Intermediate.	Wm. Rennie Co.....	12 1,000	Rather long to handle well; fairly uniform.
Mammoth Short White	Wm. Rennie Co.....	11 1,500	Good type; slightly variable in shape.
Half Long White.....	McKenzie Seed Co....	11 1,500	Too long to be desirable; fairly uniform.
Oxheart.....	Steele, Briggs Seed Co.	10 1,700	Good type and uniform.
Long White Belgian....	Steele, Briggs Seed Co.	10 600	Too long to be desirable.
Long White Belgian....	McKenzie Seed Co....	9 1,000	Too long to be desirable; varies slightly in colour.
Long Orange Belgian...	McKenzie Seed Co....	6 1,500	Too long to be desirable; fairly true.

SWEDE TURNIPS—TEST OF VARIETIES. AVERAGE, 1921-22

Variety	Source of Seed	Yield per acre	Remarks
		TonsLbs.	
Ditmars.....	Experimental Farm (Kentville, 1921). (Ottawa, 1922).	30 900	Varies slightly in colour; an excellent root.
Hall's Westbury.....	McKenzie Seed Co....	24 1,250	Mixed in colour; fairly uniform, smooth roots.
Perfection.....	Steele, Briggs Seed Co.	21 400	Shows variation in type and colour.
Superlative.....	McKenzie Seed Co....	20 1,150	Rather mixed in type and colour.
Kangaroo.....	McKenzie Seed Co....	20 700	Varies in colour; rather longer than desirable.
Monarch.....	McKenzie Seed Co....	19 900	Uniform in colour; type somewhat mixed.
Breadstone.....	McKenzie Seed Co....	19 750	Colour varies; roots coarse.
Kangaroo.....	Steele, Briggs Seed Co.	18 700	Varies in colour; roots rather long.
Good Luck.....	Steele, Briggs Seed Co.	18 450	Colour uniform; slight variation in type.
Hazard's Improved....	Steele, Briggs Seed Co.	17 750	Uniform in colour and type.
Bangholm.....	Steele, Briggs Seed Co.	17 566	Desirable from standpoint of type and colour.
Gloucester.....	Steele, Briggs Seed Co.	18 800	Rather rough; colour varies slightly.
Champion.....	Steele, Briggs Seed Co.	16 650	Type and colour variable.
Jumbo.....	Steele, Briggs Seed Co.	16 100	Colour uniform; poor type of root.
Canadian Gem.....	Steele, Briggs Seed Co.	15 850	Colour varies slightly; roots small.

SUNFLOWERS

Eight strains of sunflowers were tested in 1922. Four of the eight were selections made in the Rosthern district and one of these is especially promising. The others, and also one selection made at the Central Farm at Ottawa, were too early and were practically ripe before the grain harvest was completed, which is not an advantage for this district. These may be more valuable for districts further north.

ENSILAGE SUNFLOWERS—TEST OF VARIETIES, 1922

Variety	Average height	Stage of maturity	Yield per acre
	Inch.		Tons Lbs.
S. F. Rosthern D.....	92	Firm.....	40 1,500
Russian (McDonald).....	112	Firm.....	29 1,300
Mammoth Russian (Ottawa).....	106	Firm.....	29
Russian (Dakota).....	124	Firm.....	26 1,500
Early Ottawa 76 (Ottawa).....	98	Firm.....	26 1,000
S. F. Rosthern B.....	86	Firm.....	25 500
S. F. Rosthern A.....	90	Firm.....	25
S. F. Rosthern C.....	92	Firm.....	24 500

HAY AND PASTURE MIXTURES—USING ALFALFA AS A BASE, 1922

Plot	Rate of Seeding per acre		First Cutting				Second Cutting				Average dry weight of first and second cut	
	Alfalfa	Brome grass	Green weight		Dry weight		Green weight		Dry weight			
	Lbs.	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
1	16	8	4	66	2	1,766	4	1,600	2	150	2	958
2	14	8	5	1,266	2	350	4	50	1	1,066	1	1,708
3	12	8	5	116	2	216	3	1,650	1	900	1	1,558
4	10	8	5	1,583	2	550	3	1,000	1	666	1	1,608
5	8	8	5	1,100	2	333	3	1,383	1	833	1	1,583
6	6	8	5	1,783	2	733	3	1,250	1	666	1	1,699
7	4	8	5	1,383	2	700	3	716	1	416	1	1,558
8	10	14	5	1,766	2	700	3	466	1	633	1	1,666
9	10	12	5	1,300	2	383	3	716	1	566	1	1,474
10	10	10	5	1,616	2	400	3	1,250	1	783	1	1,591
11	10	8	6	16	2	450	3	1,300	1	683	1	1,566
12	10	6	5	1,916	2	466	3	1,086	1	650	1	1,558
13	10	4	5	1,750	2	283	3	1,233	1	666	1	1,474
14	10	2	5	1,250	1	1,900	3	1,466	1	766	1	1,333

HAY AND PASTURE MIXTURES—USING ALFALFA AS A BASE

Plot	Rate of Seeding per acre		First Cutting				Second Cutting				Average dry weight of first and second cut	
	Alfalfa	Rye grass	Green weight		Dry weight		Green weight		Dry weight			
	Lbs.	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
1	16	8	4	390	2	1,766	3	1,186	1	1,180	2	473
2	14	8	4	1,033	2	1,950	3	1,066	1	1,166	2	556
3	12	8	4	1,833	3	766	2		1	516	2	641
4	10	8	5	366	3	716	2	533	1	83	2	399
5	8	8	4	1,900	3	533	1	1,966	0	1,850	2	191
6	8	8	5	966	3	466	1	1,566	0	1,733	2	99
7	4	8	5	1,150	3	733	1	1,466	0	1,650	2	191
8	10	14	5	1,033	3	1,150	2	500	0	1,983	2	566
9	10	12	4	1,883	3	700	2	1,550	1	316	2	508
10	10	10	4	1,850	3	283	2	1,816	1	416	2	349
11	10	8	4	1,300	3	316	2	1,316	1	233	2	274
12	10	6	4	1,000	2	1,900	2	1,966	1	533	2	216
13	10	4	4	483	2	1,383	3	666	1	783	2	83
14	10	2	3	1,500	2	800	3	1,066	1	950	1	1,875

VARIETIES OF RYE GRASS

Five varieties of rye grass were sown in triplicate plots of one one-hundredth acre each. Plots were cut for the first time on July 7 and for the second time on August 19.

Variety No. 4 appeared to be rather coarse and glaucous and, from the pasture point of view, did not seem to be as good as No. 5, which stooled well, was green in colour and carried its leaves down to the ground, leaving lots of good grass after cutting that would be suitable for pasture. No. 6 was similar to No. 4, but stooled better, and No. 10 could be placed between No. 4 and 5, being slightly coarser than No. 5 and finer than No. 4. No. 11 appeared to be similar to No. 5.

Not only was No. 5 the choice grass in the field, but it also showed that it gave a good yield of hay, standing second only to No. 6 in cured hay for the first cutting, although in last place for the second cutting, as is shown by the table of yields.

WESTERN RYE—TEST OF VARIETIES FOR YIELD AND PURITY

Variety No.	First Cutting		Second Cutting		Average dry weight first and second cut
	Green weight	Dry weight	Green weight	Dry weight	
	Tons Lbs.	Tons Lbs.	Tons Lbs.	Tons Lbs.	Tons Lbs.
4	4 1,966	2 1,250	1 383	0 1,100	1 1,175
5	4 1,133	3 0	1 183	0 1,000	1 1,500
6	4 1,200	3 166	1 183	0 1,116	1 1,641
10	3 1,766	2 1,050	1 366	0 1,233	1 1,141
11	4 200	2 1,150	1 1,016	0 1,050	1 1,100

POULTRY

The poultry flock on the Farm now consists entirely of White Wyandottes, and good progress has been made in raising the average production of the flock since the year 1916. The flock average in egg production in that year was 115 eggs per bird, and the highest individual record was 220. During the past year the flock average was 179 eggs per bird, and the highest individual record was 260 eggs, with 259 the next highest.

There has been an excellent demand for breeding stock and hatching eggs, all available surplus stock and eggs being sold to farmers and poultrymen at reasonable prices.

HATCHING RESULTS, 1921

The following table will show the results during the hatching season. The poor results obtained in the May-hatched chickens is accounted for by the fact that a skunk, in one night, killed the majority.

HATCHING RESULTS FOR SETTINGS BY THE MONTH, 1921

Time set	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number of chicks alive July 1	Per cent chicks hatched alive July 1	Total eggs required for one chick hatched	Total fertile eggs for one chick hatched
March 26	362	125	34	96	26	76	30	31·0	3·7	1·3
April	1,383	806	65	525	38	65	455	86·6	2·6	1·5
May	1,153	428	37	243	21	57	40	16·4	4·7	1·8
Total	2,898	1,359	45·5	864	27·8	63·5	525	60·7	3·3	1·5

Owing to all the hatching being done with one incubator, a 1,200-egg Buckeye, no comparison of different machines or methods of hatching was possible, and, as the limited number of pedigree boxes available were all required to keep separate the eggs from the various special matings, no comparison of the hatching results of the flock as a whole can be made in comparing the results secured from eggs produced by hens and pullets. It was notable, however, that, in special matings, the eggs from the hens produced more and stronger chicks than those from the pullets, and this conforms with the general experience of other years, although occasionally exceptional years produced opposite results.

BROODING METHODS

All chicks were housed in the brooder house for the first month, then moved to colony houses with coal brooders in them and gradually hardened off until

ready to be placed in unheated colony houses. The coal brooder has proved very satisfactory and keeps the temperature uniform in spite of fluctuating temperature.

THE SASKATCHEWAN EGG LAYING CONTEST

The second Saskatchewan Egg Laying Contest was started on November 1, 1920, and, continuing for fifty-two weeks, finished on October 30, 1921. The third year was completed on October 30, 1922. Eighteen pens of birds, representing seven breeds, were entered.

Poultry raisers desiring to enter pens are required to make application for entry under the regulations, copies of which are supplied on request. The flock is inspected before the application is accepted, and, if the pullets are found to be satisfactory, the entry is accepted.

The contest work is responsible for a largely increased interest in poultry raising in the province. It has shown that some strains of birds are capable of very profitable production under our climatic conditions, and is a source of information to prospective purchasers as to whose pens are demonstrating good laying ability. Details concerning these contests will be found in Bulletin No. 38, New Series, copies of which are available at the Publications Branch, Department of Agriculture, Ottawa.

BEEF SCRAP VS. TANKAGE FOR PULLETS

Two pens of fifty pullets each were used for this test. Care was taken to select birds as nearly equal as possible in every respect. They were housed in the same building and received the same feed, with the exception that one pen received 10 per cent of beef scrap in the dry mash, while tankage was used in the same percentage in the other pen.

The following table gives the results of this experiment:—

BEEF SCRAP *vs.* TANKAGE

—	Number of birds in pen	Wheat	Oats and barley	Mash	Grit	Shell	Charcoal
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Beef scrap	50	2,018	1,243	1,640	60·5	64·0	42·0
Tankage	50	2,048	1,204	1,663	74·5	73·5	46·5

	Value of feed	Eggs laid	Price per dozen	Value of eggs	Loss or gain per pen	Loss or or gain per hen	Cost of 1 dozen eggs
	$		cts.	$	$	cts.	cts.
Beef scrap	78·81	4,534	32·3	122·32	+43·51	+ 87	20·8
Tankage	79·78	4,363	32·6	118·82	+39·04	+ 78	21·6

It will be noted that the results slightly favour the use of beef scrap, in spite of its higher cost, as a source of animal food for laying hens.

It was notable that during the cold months of November, December and January the beef scrap gave considerably better results while the tankage gained somewhat during the warmer weather.

COMMERCIAL VS. HOME-MIXED FEEDS FOR PULLETS

Two pens of twenty-five pullets each were selected for as great uniformity as possible. They were housed in the same building and fed under identical conditions. Group 1 received a commercial grain mixture and a commercial mash, both put up and sold by one of the milling companies as suitable for egg production. Group 2 received a home-mixed mash and scratch grain. The home-made mash was mixed in the proportions as follows: bran, 250 pounds; ground barley, 100 pounds; shorts, 100 pounds; beef scrap 100 pounds; linseed meal, 50 pounds; salt, 6 pounds. The home-mixed scratch grain was in the proportions of two of wheat, one of corn and one of barley. The results are given in the following table:—

COMMERCIAL *vs.* HOME-MIXED FEEDS

—	Number of birds in pen	Commercial scratch feed		Mash	Grit	Shell	Charcoal
		Lbs.		Lbs.	Lbs.	Lbs.	Lbs.
Commercial feed	25	1,622		749	24·5	31	26
		wheat	oats and barley				
Home-mixed feed	25	1,038	733	791	20·5	29	22·5

—	Value of feed	Eggs laid	Price per dozen	Value of eggs	Loss or gain per pen	Loss or gain per hen	Cost of 1 dozen eggs
	$		cts.	$	$	$	cts.
Commercial feed	76·38	3,135	31·3	84·13	+ 7·75	+0·31	29·2
Home-mixed feed	40·24	3,087	33·0	88·18	+47·94	+1·91	15·6

It will be noted that while a few more eggs were produced by the commercial ration group, yet the cost of feed was so much more than for the home-mixed feeds that the margin of profit over cost of feed was very much greater in the case of the home-mixed ration. This is solely due to the price asked for the commercial feeds and will depend entirely on what the commercial feed costs as compared with the same feeds purchased separately and mixed at home.

HATCHING RESULTS

The results obtained in hatching eggs from pullets and hens are given in the accompanying table.

HATCHING RESULTS 1922.

	Eggs set	First Test			Second Test		Total hatch	Cripples	Put in brooder	Per cent fertile	Percent fertile hatched	Per cent total eggs hatched
		Infertile	Blood rings	Left in	Dead germs	Left in						
Total pullets	2,574	958	336	1,280	292	988	666	35	631	49·7	63·86	25·83
Total hens	902	462	107	323	58	265	170	11	159	35·8	58·82	16·62
Grand total	3,476	1,420	443	1,503	350	1,253	836	46	789	43·23	55·62	24·3

It will be noted that the pullets this year gave decidedly better hatching results than the hens. This is not usually the case and it should be remembered that the pullets used in this experiment were well developed and had been laying since quite early in the fall; in no case were any used that had not been laying well throughout the winter.

DATES OF HATCHING

A comparison of the results of hatches during the various months is given in the accompanying table.

HATCHING RESULTS FOR SETTINGS BY THE MONTH—1922

Time hatched	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Number chicks alive July 1	Per cent fertile eggs hatched	Per cent chicks hatched alive July 1	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched	Total eggs required for 1 chick July 1
April.....	591	353	59	188	31	161	53	85	3·1	1·8	3·6
May.....	2,255	1,010	44	483	21	252	47	52	4·6	2·1	8·8
June.....	315	179	56	110	34	42	61	38	2·8	1·2	7·5

It will be noted that the results of hatches which came off in April were much superior to those hatched in May and June. The chicks obtained from the April hatches, also, were much superior to those hatched later, making better development and growth throughout the entire season.

INCUBATOR VS. HENS

A comparison of the results from hatching in the large Candee incubator and the use of hens is given below.

HATCHING RESULTS—INCUBATOR VS. HENS, 1922

Incubator	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number of chicks alive July 1	Per cent chicks hatched alive July 1	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched	Total eggs required for 1 chick July 1
Candee.....	3,056	1,477	48	741	24	50	424	57	4·1	1·9	7·2
Hens.....	105 (15 broken)	65	51	40	38	61	31	77	2·6	1·3	3·3

The foregoing results in hatching would indicate that hens give better results than incubators. However, it will be noted that the percentage of eggs set are not comparable. Therefore, results are not considered conclusive. For the hatching of large numbers of chicks, the use of an incubator is to be recommended.

PLANT PATHOLOGY

A series of experiments is being carried on under the supervision of W. P. Fraser, Division of Botany, officer in charge of cereal disease investigation in the Prairie Provinces. These experiments are for the purpose of determining the effects of stem rust on different varieties of wheat, controls for smut and other plant diseases.

The result of these experiments are published by the Division of Botany.

OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1925.