DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

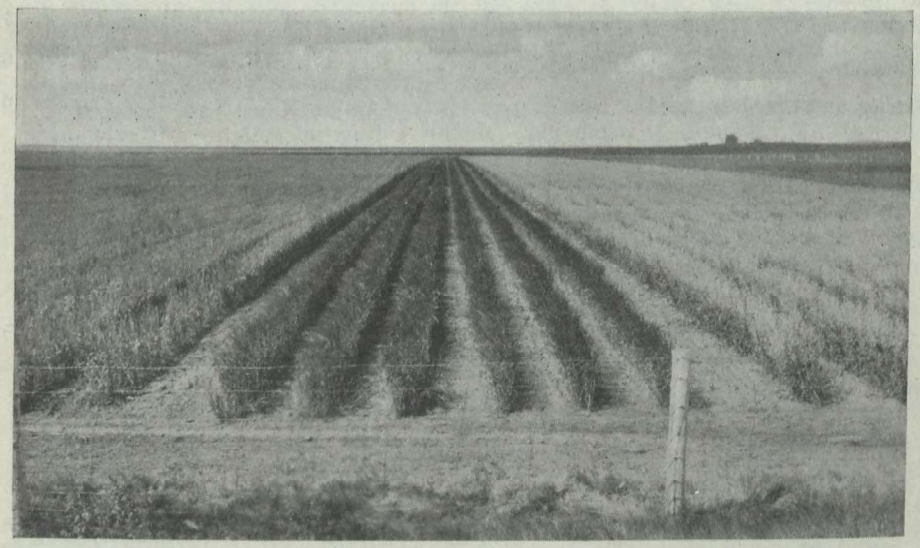
EXPERIMENTAL STATION

SCOTT, SASK.

REPORT OF THE SUPERINTENDENT

G. D. MATTHEWS, B.S.A.

FOR THE YEAR 1928



Elite stock plots of Marquis, Hannchen and Banner at Scott.

Printed by Authority of the Hon. W. R. Motherwell, Minister of Agriculture,
Ottawa, 1929

TABLE OF CONTENTS

DOMINION EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE SUPERINTENDENT, G. D. MATTHEWS, B.S.A.

SEASON

Winter temperatures of 1928 were moderate except for the opening days of the year. Less than an inch of snow was recorded for both January and February. Summer-fallow remained bare until March 11 when eleven inches of snow fell, but this disappeared during the third week of March. During the latter part of March day temperatures of over 50 degrees Fahrenheit, accompanied by mild night temperatures, started sap moving in certain trees. When zero temperatures followed in April, severe damage was caused to fruit trees, particularly apples. Intermittent snowfalls occurred during April.

May was dry and windy. Seeding started somewhat late but continued without a break. Dry weather in May caused uneven germination of grain, particularly on spring ploughing and gave a severe set-back to hay crops. Frequent rains during June and July, amounting to 2·73 and 3 inches respectively, produced vigorous growth in all grain crops. Garden crops did not make rapid progress. Hot weather prevailed during the first twelve days of August, followed by a gradual drop in temperature until three successive frosts occurred on August 23, 24 and 25-with disastrous effects to all growing crops.

Garnet and Reward wheat escaped frost. Marquis was damaged by frost, depending on stage of maturity. At this Station it is estimated that Marquis on summer-fallow was decreased 30 per cent in yield, with a loss of three commercial grades, while Marquis on stubble was decreased 15 per cent in yield with a loss of two grades. Tender vegetables ceased growth. Immediate ensiling was necessary with sunflowers.

Weather was ideal for all harvest operations. Moderate temperatures and extremely dry weather prevailed during the closing months. The following table shows the dates of farm operations for the season of 1928.

Details covering weather at this Station are given in another table where figures are presented showing temperatures, precipitation, sunshine, wind, and evaporation from a free water surface for 1928 and a number of years. These figures will aid in interpreting many results from field experiments. The annual precipitation for seventeen years is 13·29 inches.

DATES OF FARM OPERATIONS, 1928

Farm operations	Began	Finished
Spring ploughing	April 27	May 25
Seeding wheat	May 2	" 17
" oats	" 16	" 26
" barley	" 15	" 15
" sunflowers	" 16	" 23
Planting potatoes	" 17	" 18
Ploughing summer-fallow	" 30	June 16
Cutting hay	July 9	Aug. 10
" barley	Aug. 20	" 20
" fall rye	" 13	" 13
" oats	" 21	Sept. 13
" wheat	" 21	" 10
" sunflowers	" 25	Aug. 27
Threshing	Sept. 10	Oct. 3
Digging potatoes	" 24	Sept. 27

Month	Temperature °F						Precipitation				Sunshine		Wind		Evaporation	
	Maximum		Minimum		Mean											
	Highest	Mean maximum	Lowest	Mean minimum	1928	Average 17 years	Rain	Snow	Total 1928	Average 17 years	1928	Average 17 years	1928	Average 6 years	1928	Average 5 years
	°	°	°	°	°	°	in.	in.	in.	in.	hours	hours	miles	miles	in.	in.
January	42·7	17·30	−45·0	−2·15	7·58	0·26	.....	0·09	0·01	0·55	114·1	89·0	9,259	9,106	.....	.....
February	46·0	23·72	−22·2	3·67	13·70	3·65	.....	0·66	0·07	0·48	138·8	118·2	9,225	8,483	.....	.....
March	54·6	30·65	−16·7	10·62	20·64	14·51	0·03	13·30	1·36	0·58	148·9	158·4	9,353	9,972	.....	.....
April	75·0	41·08	−4·0	20·75	30·92	37·15	.....	15·40	1·54	0·94	182·8	211·5	8,842	9,782	.....	.....
May	91·7	69·78	23·0	39·47	54·63	49·37	0·82	.....	0·82	1·39	334·3	263·0	11,902	10,352	5·55	4·68
June	85·8	67·84	35·0	43·59	55·71	57·43	2·73	.....	2·73	2·16	237·8	273·3	7,889	8,852	3·22	3·76
July	88·0	74·64	40·0	50·71	62·67	58·66	3·00	.....	3·00	2·40	293·0	330·4	7,402	8,207	3·49	5·51
August	92·5	70·83	27·0	41·52	56·18	60·01	0·61	.....	0·61	1·91	292·1	261·2	6,855	7,585	3·05	3·80
September	83·5	66·52	8·3	31·77	49·15	49·86	0·16	.....	0·16	1·40	243·8	180·0	8,593	8,402	3·48	3·02
October	61·8	48·75	10·0	23·84	36·30	37·99	0·01	3·50	0·36	0·63	137·6	145·3	9,629	8,786	.....	.....
November	48·1	38·94	1·8	14·63	26·79	22·15	.....	.....	.....	0·35	142·0	102·6	8,013	7,846	.....	.....
December	46·6	27·31	−26·0	7·78	17·55	7·20	.....	2·75	0·28	0·50	63·2	79·8	9,056	8,958	.....	.....
Totals	.....	.....	.....	.....	.....	.....	7·36	35·70	10·94	13·29	2,228·4	2,212·7	106,018	106,331	18·79	20·77

ANIMAL HUSBANDRY

The experimental work in live stock, poultry and apiculture is under the supervision of E. Van Nice, B.S.A., Assistant to the Superintendent, who has compiled the data given under these headings.

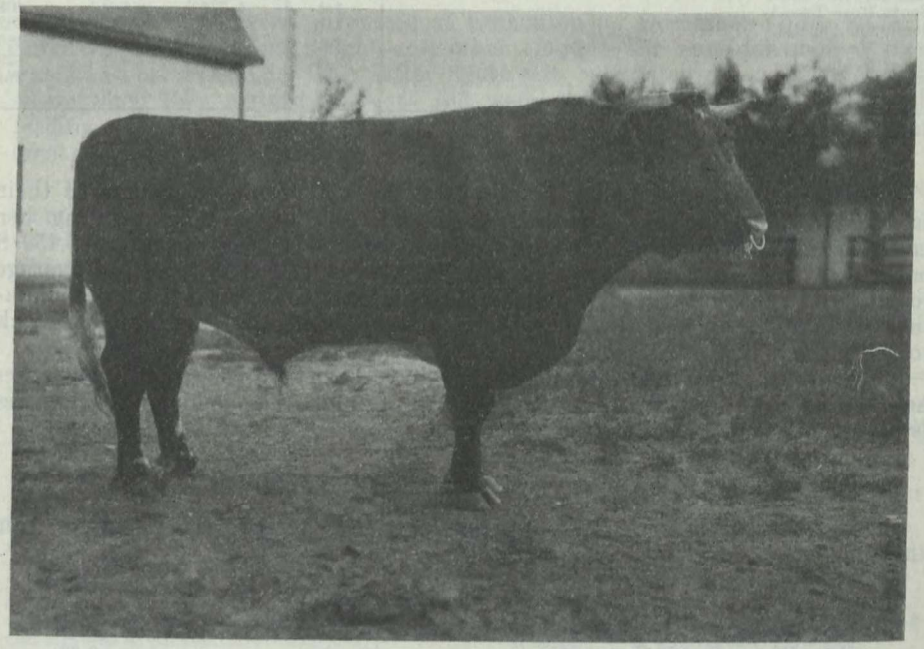
HORSES

Twenty-one pure-bred Percherons, six grade Clydes and one driver make up the total of twenty-eight horses on hand at the end of December, 1928. Four foals born in 1928 have been included. These colts were sired by Presto—[8084]—125771, a class A stallion sired by Orphan Boy—[8082]—87684. During the season of 1928 five mares were bred to this stallion.

No experimental work has been conducted with horses during the past year.

CATTLE

The only breed of cattle at this Station is the Shorthorn. The policy being followed is to endeavour to maintain a good beef type and select for a reasonable milk flow. The breeding herd on December 11, 1928, consists of nineteen



Red Marquis—156496—herd sire.

head of adult females, thirteen head of young females over one year old, twelve head of calves and one aged bull. A very valuable addition came to the herd when six mature cows and five young females were transferred, in November, from the Dominion Experimental Farm, Indian Head. In addition to the breeding herd, there are twenty grade steers on an experimental feeding test during the winter of 1928-29.

The herd sire in use during 1928 is Red Marquis—156496—, which was procured in 1927 from Alexander MacLaren of Buckingham, Que. The sire of

this bull is Thanet Marquis (Imp.) and the dam Rosebud 12 (Imp.), with a milk record of 11,629 pounds in 339 days, testing 3·64 per cent fat. The bull is smooth in appearance and possesses a strong constitution.

MILK RECORDS

The following table shows the milk records completed at this Station during the past year.

MILK RECORDS COMPLETED DURING 1928

Name of cow	Lactation period	Pounds of milk	Per cent fat	Days milking
*Prairie Red Rose 13	6th	8,475	4·4	452
Prairie Red Rose 16	6th	6,547	4·4	331
*Indian Head Mayflower	4th	6,522	.....	334
Scott Pride 2	3rd	6,402	3·6	279
Pride of Qu'Appelle 7	9th	5,848	4·3	270
Indian Head Pride 3	4th	5,660	4·0	330
*Prairie Red Rose 15	4th	5,206	4·1	367
Scott Red Rose	4th	5,009	4·0	313
Jess Mayflower 2	6th	4,855	4·6	306
Scott Rose Tree 3	1st	4,774	4·2	408
Jessie Qu'Appelle	4th	4,439	4·3	262
Scott Rosebud	1st	4,422	4·5	415
Scott Pride 4	1st	4,265	4·4	429
Scott Prairie Rose 2	1st	4,014	4·3	364

*Received from Indian Head Farm, November 1928.

Several of the cows listed in the above table have higher records to their credit, but these figures show the actual yield from each cow during her latest lactation period. The average figures for the fourteen cows are 5,459·8 pounds of milk, 4·2 per cent fat and 347 days. A herd with this average record, and headed by such a bull as Red Marquis constitutes a good foundation for building up a herd which will be invaluable in supplying breeding stock to the farmers of the district.

During the year 1928 nine bull calves have been sold for breeding purposes and the demand has been greater than the supply. The demand for females is also strong but only a few have been sold.

COST OF RAISING SHORTHORN FEMALES

Separate records of feed and pasture were kept for two female calves from the time of weaning until two years old.

FEED AND PASTURE (2 head)

	Total cost
Oats, 1,922 pounds at $1.07 per hundred	$ 20 57
Bran, 718 pounds at $1.35 per hundred	9 69
Silage, 4,319 pounds at $3.50 per ton	7 56
Oat sheaves, 112 at 5 cents each	5 60
Oilcake meal, 141 pounds at 2·6 cents per pound	3 67
Hay, 1,950 pounds at $10.00 per ton	9 75
Pasture, 6 months 1927 as calves at 60 cents per month	7 20
Pasture, 7 months 1928 at $1.80 per month	25 20
Total cost for 2 heifers	$ 89 24
Cost per head	44 62

It should be stated that these heifers were fed for maximum development and received more feed than is usually fed on an average farm. To this figure should be added the keep of the dam for one year, assuming that the calf

runs with the cow and consumes all of the milk. It has been found that the cost of feed and pasture for one cow, for a year, averages at the Scott Station $41, making a total of $85.62 for the total cost of raising a heifer to two years of age; this figure excluding labour and cost of housing.

STEER-FEEDING

Steer-feeding tests conducted during the winter of 1927-28 included a continuation of the test of prairie hay, western rye hay and sunflower silage as roughages, supplementing oat straw and chop for fattening steers. In addition, one lot of steers was fed an equal quantity of sweet clover hay to determine its relative value to the other kinds of hay under test. The quality of the sweet clover hay was only fair, due to the fact that it was cut late from a field which had been pastured; but it was eaten readily and relished by the steers. The oat straw was of a reasonably good quality but contained practically no green growth. The sunflowers were frosted before being cut and were rather drier than usual when ensiled. The prairie hay was of a good quality. The western rye grass was cut late and consequently was too coarse to make first-class hay.

Twenty steers were purchased at Edmonton on December 17 for $6.88 per hundred. After adding freight and other charges, the cost delivered at Scott was $7.54 per hundred. This latter figure was calculated on the weight of the steers when they arrived at Scott and were about to be put on experimental feeding. It was used as the cost price in calculating the results of the experiment.

In the following tables will be found the results of the steer-feeding experiment in which the following roughages were fed: Prairie wool; western rye; sweet clover and sunflower silage. These were compared with the check lot in which straw was the only roughage fed.

FEED PRICES AND TOTAL QUANTITY FED

—	Prairie wool	Western rye	Sweet clover	Sunflower silage	Check (straw)
	$	$	$	$	$
4,115 pounds oat chop at 1 cent per pound, plus $1.50 per ton for crushing	44 24	44 24	44 24	44 24	44 24
2,018 pounds barley chop at 1 cent per pound, plus $1.50 per ton for crushing	21 69	21 69	21 69	21 69	21 69
5,510 pounds prairie wool at $10 per ton	27 55	.....	.....	.....	.....
5,510 pounds western rye hay at $10 per ton	.....	27 55	.....	.....	.....
5,510 pounds sweet clover hay at $10 per ton	.....	.....	27 55	.....	.....
8,160 pounds sunflower silage at $3.50 per ton	.....	.....	.....	14 28	.....
Salt at $1.60 per cwt	0 53	0 64	0 74	0 50	0 48
Oat straw at $2 per ton	5 59	5 17	5 38	5 52	7 62

Average daily ration per head for feeding period

Feeds	lb.	lb.	lb.	lb.	lb.
Meal mixture	10·6	10·6	10·6	10·6	10·6
Hay (prairie, western rye or sweet clover)	10·0	10·0	10·0	.....	.....
Sunflower silage	.....	.....	.....	14·1	.....
Salt	0·058	0·069	0·080	0·054	0·052
Straw	9·70	8·97	9·33	9·59	13·23

STEER-FEEDING EXPERIMENT, 1927–28

—		Prairie wool	Western rye	Sweet clover	Sunflower silage	Check (straw)
Number of steers in lot		4	4	4	4	4
Initial gross weight December 30		3,485	3,480	3,480	3,470	3,465
Initial average weight December 30	lb.	871	870	870	868	866
Final gross weight May 22	"	4,305	4,395	4,585	4,420	4,160
Final average weight May 22	"	1,076	1,099	1,146	1,105	1,040
Total gain per lot	"	820	915	1,105	950	695
Total gain per head in 144 days	"	205	229	276	238	174
Average daily gain per head	"	1·42	1·59	1·92	1·65	1·21
Feed required per 100 pounds gain—						
Straw at $2 per ton	"	681	565	487	581	1,096
Prairie wool at $10 per ton	"	672	.....	.....	.....	.....
Western rye hay at $10 per ton	"	.....	602	.....	.....	.....
Sweet clover hay at $10 per ton	"	.....	.....	499	.....	.....
Sunflower silage at $3.50 per ton	"	.....	.....	.....	859	.....
Meal mixture at $1.08 per cwt	"	748	670	555	646	882
Salt at $1.60 per cwt	"	4·0	4·3	4·2	3·3	4·3
Cost of all feed per 100 pounds gain	$	12 14	10 85	9 01	9 08	10 62
Cost of all feed per head	$	24 90	24 82	24 90	21 56	18 51
Initial cost of steers per head at $7.54 per cwt.	$	65 69	65 60	65 60	65 41	65 32
Initial cost plus cost of feed per head	$	90 59	90 42	90 50	86 97	83 83
Selling price per head at Scott at $8.79 per cwt.	$	94 60	96 58	100 76	97 13	91 42
Returns per head less initial cost and cost of feed	$	4 01	6 16	10 26	10 16	7 59

In this test sweet clover produced the greatest gains and highest profits, with sunflower silage ranking a close second. This is the first test made at this Station in feeding sweet clover to fattening steers. A second test is under way during the winter of 1928-29.

Comparative results are available for two years testing of prairie hay, western rye, oat sheaves and sunflower silage. The average figures for three principal comparisons are given in the following table, with a check lot included which received no other roughage than oat straw.

ROUGHAGES FOR FATTENING STEERS—Average of Two Years

—		Prairie wool	Western rye	Oat sheaves	Sunflower silage	Oat straw only (check)
Average daily gain per head	lb.	1·81	1·66	1·53	1·70	1·32
Cost per 100 pounds gain	$	9 81	10 71	12 23	9 70	13 50
Grain required per 100 pounds gain	lb.	555	611	696	687	936

Prairie hay ranks highest in two out of the three points of comparison and a close second in the third. This is sufficient to place it first among the roughages included. Sunflower silage ranks second in value by showing the lowest cost of gain, the second highest daily gain and ranking third in grain required per 100 pounds gain. Western rye ranks third in two points and second in one. Oat sheaves stands fourth in every point of comparison used, and the check lot receiving straw as a sole roughage takes the bottom place in each case. This summary indicates the relative value of these roughages to be in the following order, when used for fattening steers in conjunction with a liberal grain ration and oat straw. First, prairie hay; second, sunflower silage; third, western rye hay, and fourth, oat sheaves with oat straw alone ranking lowest.

SHEEP

Three breeds of sheep—Shropshires, Cheviots and Rambouillets—have been kept at this Station for several years. Each flock consists chiefly of grade ewes and the numbers are reduced annually to approximately twenty-five breed-

ing ewes. In addition to the grades, a few pure-bred females of each breed constitute a foundation for pure-bred flocks. A good pure-bred ram of each respective breed heads each flock, and rams have been changed every two seasons to avoid inbreeding. The Shropshire ram used for the 1928 lamb crop was Indian Head—320—55085—, sired by an imported Buttar ram. The Cheviot ram was MacDonald—898—2179— bred at MacDonald College. The Rambouillet sire was Lethbridge —168—1958—, sired by Glenside 8—366—.

BREED TESTS

Comparative notes have been recorded for the three breeds and in closing out the experiment in grading-up and breed comparisons, the accompanying table shows some of the data obtained.

BREED COMPARISONS

——		Shropshire	Cheviot	Rambouillet
Average wieght of lambs at birth (total for six years)	lb.	8·7	8·1	8·6
Lambs raised to seven months of age (in proportion to ewes—6 years)	%	82·7	80·1	112·3
Average weight of lambs at seven months (total for 6 years)	lb.	75·8	72·5	78·9
Average weight of wool-clip for entire flocks. (5 years)	"	7·9	7·2	9·0
Average price per pound for wool as graded. (3 years)	cts.	26·7	26·2	28·0
Average returns per head for wool as graded. (3 years)	$	2 07	1 89	2 52
Average weight of mature ewes	lb.	123	123	123
Three-year average total, November weight of all lambs from 20 ewes	"	1,654	1,602	2,246
Average dressing percentage of ten lambs seven months old (single test)	%	44	45	47
Meal required per 100 pounds gain fifteen lambs per lot (single test)	lb.	438	581	499

The Shropshire is perhaps the most common of the domestic breeds of sheep in northwestern Saskatchewan; but in this test has failed, in most points, to make as good a showing as the Rambouillet.

The Cheviot has proven itself to be a good rustler on short pasture, by often coming in from pasture in the fall in better condition than the other breeds. The absence of wool on the head and legs and the alert carriage of the ears give the Cheviot a decidedly attractive appearance. This breed furnishes a very desirable carcass of mutton. An undesirable feature of the breed is the coarse open fleece, which results in lower returns from wool and frequent colds during winter. The nervous, timid and frequently wild disposition makes the Cheviot difficult to handle.

The Rambouillet is docile and easily handled. It has a natural flocking instinct which is quite desirable in a breed of sheep. The ewes are good mothers, and appear to be slightly more prolific than the other two breeds in question and stand high in the percentage of lambs raised. The greater density of the fleece makes the Rambouillet peculiarly adapted to the cold and changeable climate of northwestern Saskatchewan. Specimens of this breed are slightly more upstanding than the Shropshire and Cheviot, which breeds have a shorter and better filled leg of mutton.

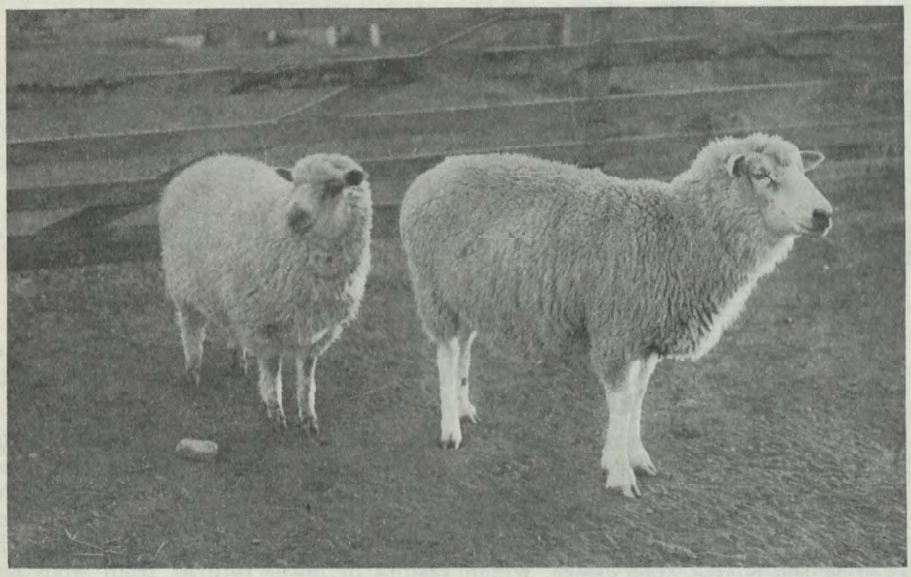
SUMMARY.—This test indicates that the Rambouillet, on account of its prolificacy, fair mutton qualities and superior fleece, would prove most profitable of the three breeds for a domestic farm flock under conditions similar to those at this Station.

The Cheviot, by reason of its open fleece, wild and nervous disposition, would not seem as desirable as the other two breeds in this test for domestic flocks in northwestern Saskatchewan.

The Shropshire is a good domestic breed and quite common on the prairies, but in this test has not made as good a showing as the Rambouillet, in percentage of lambs, weight of lambs at seven months, dressing percentage or value of fleece.

WOOL

The average wool-clip per head for 1928 was 7·8 pounds for Shropshires, 6·8 pounds for Cheviots and 9.7 pounds for Rambouillets. Each fleece was labelled as it was removed from the sheep, and the wool was shipped to the Canadian Co-operative Wool Growers at Regina. Each fleece was graded separately, and the accompanying table shows the percentage of wool falling in each grade. The full returns have not been received at the time of writing; but in 1927 the spread in price between the best wool, "fine staple", and the poorest, graded as "low staple", was six cents per pound.



Original range ewe with first cross Shropshire lamb.

WOOL GRADING 1928

Grades of wool	Per cent of wool in each grade		
	Cheviot	Shropshire	Rambouillet
Fine Staple	.....	.....	6·3
Fine Medium Staple	.....	.....	76·5
Fine Medium Clothing	.....	.....	.....
Medium Staple	.....	39·3	17·2
Medium Clothing	.....	3·2	.....
Low Medium Staple	67·6	57·5	.....
Low Staple	32·4	.....	.....

This table shows at a glance the difference in quality of wool obtained from these three breeds.

GOITRE IN LAMBS

One per cent potassium iodide in the salt fed during the gestation period has repeatedly resulted in the prevention of goitre in the lambs. During the winter of 1927-28 one lot of ewes was fed one-quarter of one per cent of potassium iodide in the salt ration; one lot one-half of one per cent and a third lot was given none and used as a check lot. There was no evidence of goitre, even in the check lot, in the spring of 1928, which rendered it impossible to give the potassium iodide credit for the prevention of goitre. The same thing happened the previous year with a similar test, which indicates that the conditions causing goitre in the flock a few years ago have been corrected. However, potassium iodide is still used as a preventive measure.

LAMB-BREEDING EXPERIMENT

For a three-year period, a test has been conducted to determine the advisability of breeding ewe-lambs in the autumn of the same year in which they are born. One group of lambs were bred so that they would lamb at about one year of age. An equal number of lambs were weighed but not bred until one year later.

The accompanying table shows the results according to breeds.

The forty-one ewe lambs bred when seven months old, and again at nineteen months, produced only forty-six lambs, or 112 lambs per hundred ewes as a total for the two years. Thirty-three lambs were raised, or 80 per cent as many lambs as ewes, an average of 40 per cent per year.

The forty-six ewes not bred until nineteen months old produced forty-eight lambs in one season or 104 lambs per hundred ewes, and the number of lambs raised was 38 or 82 per cent as many lambs as ewes. Five more lambs per hundred ewes were raised by not breeding the ewes at seven months. Hence, this test indicates that it is not advisable to breed lambs at seven months of age, but rather to wait and then breed them so that they will drop their first lambs at about two years of age.

81121—2½

—	Ewes in test	—	First year								Second year								Total lambs	Total lambs raised
			Average weight of ewes in November	Lambs born	Average weight of lambs at birth	Condition at birth			Number of lambs raised	Average weight of lambs in November	Average weight of ewes in November	Lambs born	Average weight of lambs at birth	Condition at birth			Number of lambs raised	Average weight of lambs in November		
						Good	Weak	Dead						Good	Weak	Dead				
			lb.		lb.					lb.	lb.		lb.					lb.		
Shropshire	12	Bred at 7 months	87·2	5	8·7	2	1	2	3	76	120	11	7·2	5	3	0	8	75·0	16	11
Cheviot	15	" "	79·4	9	6·6	2	5	2	4	60	113	11	9·2	9	4	0	9	71·7	20	13
Rambouillet	14	" "	88·0	3	7·0	1	2	....	2	62	116	7	8·7	5	2	0	7	89·5	10	9
	41			17					9			29					24		46	33
Shropshire	12	Bred at 19 months	.....	.....	.....	.....	.....	.....	.....	.....	114	10	9·1	4	6	0	6	90·0	10	6
Cheviot	18	" "	.....	.....	.....	.....	.....	.....	.....	.....	102	20	8·1	12	4	4	14	75·0	20	14
Rambouillet	16	" "	.....	.....	.....	.....	.....	.....	.....	.....	122	18	8·3	12	6	6	18	87·0	18	18
Totals	46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48	.....	.....	.....	.....	38	.....	48	38

SUNFLOWER SILAGE FOR FEEDER LAMBS

Sunflower silage has already proven to be an excellent supplement to the grain ration of fattening lambs, particularly when the other roughage used is of a low quality. During the winter of 1927-28, the test was repeated to verify previous excellent results.

LAMB-FEEDING EXPERIMENT, 1927-28

——		Silage	No Silage
Number of lambs in each lot		14	14
First gross weight	lb.	961	962
First average weight	"	68·6	68·7
Final gross weight	"	1,340	1,200
Final average weight	"	95·7	85·7
Total gain per lot in 91 days	"	379	238
Total gain per head in 91 days	"	27·1	17·0
Average daily gain per head	"	0·30	0·19
Total concentrates consumed	"	2,109	2,109
Total silage consumed	"	2,053	.....
Total cost of feed (including silage and straw)	$	42 66	40 47
Concentrates consumed per 100 pounds gain	lb.	556	886
Cost of all feed per 100 pounds gain	$	11 26	17 00
Extra gains produced by silage	lb.	141	.....
Returns from silage per ton	$	23 35	.....

FEED COSTS AND TOTAL AMOUNT FED

——		Silage	No Silage
928 lb. oats at $1.79 per cwt	$	16 61	16 61
788 lb. barley at $1.60 per cwt	$	12 61	12 61
196 lb. oilcake at $2.70 per cwt	$	5 29	5 29
196 lb. bran at $1.35 per cwt	$	2 65	2 65
2,053 lb. silage at $3 per ton	$	3 08	.....
2,420 lb. straw at $2 per ton	$	2 42	.....
3,312 lb. straw at $2 per ton	$	.....	3 31
Total value of feed consumed	$	42 66	40 47

AVERAGE RATION PER HEAD PER DAY

——		Silage	No Silage
Concentrates	lb.	1·7	1·7
Straw	"	1·9	2·6
Silage	"	1·6	.....

The 2,053 pounds of silage fed in this test have produced 141 pounds extra gain as compared with the check lot receiving no silage. If it may be assumed that this gain is as valuable as the gain produced in the check lot, which was made at a cost of $17 per hundred, the 2,053 pounds of silage fed would show a value of $23.97 or $23.35 per ton. This value seems almost unreasonable, but it should be stated that in the several similar tests, it has been observed that the lower the quality of the other roughage fed to lambs, the higher the

value of the silage would be. For example, in two previous tests sunflower silage has shown a value of $11.97 and $10.59 respectively when the other roughage used was oat straw of a fair quality.

In 1926-27, considerable sweet clover and western rye grass was fed to both lots in conjunction with oat straw, and the value of the sunflower silage was only $2.46 per ton.

SWINE

The Yorkshire is the only breed of swine at this Station. The breeding herd consists of twenty brood sows and two boars. A number of young boars are sold each year to farmers in the district and young brood sows are sold in the fall after the summer-feeding experiments have been completed.

WINTER-FEEDING EXPERIMENTS

During the winter of 1927-28 three lots of fall pigs were fed inside upon the following rations: Oats and shorts, oats and barley and oats alone were under test as winter feeds. The proportions of shorts or barley was one-quarter at the beginning and increased to one-third toward the end of the test. All grain was chopped and fed dry, and water was supplied in a separate trough.

OATS AND SHORTS VS. OATS AND BARLEY VS. OATS ALONE

		Oats and shorts	Oats and barley	Oats alone
Number of pigs in each lot		10	10	10
Initial weight of each lot	lb.	561	561	560
Initial average weight	"	56	56	56
Final weight of each lot	"	1,783	1,500	1,390
Final average weight	"	178	150	139
Total gain per lot (96 days)	"	1,222	939	830
Average gain per pig	"	122	94	83
Average daily gain per pig	"	1·27	0·98	0·86
Oat chop consumed at 1 cent per pound plus $1.50 per ton for crushing	"	1,635	1,635	2,270
Shorts consumed at $1.45 per cwt	"	635	.....	.....
Barley consumed at 1 cent per pound plus $1.50 per ton for crushing	"	.....	635	.....
Oilcake meal at $2.70 per cwt	"	142·5	142·5	142·5
Tankage consumed at $2.25 per cwt	"	142·5	142·5	142·5
Bran at $1.35 per cwt	"	285	285	285
Sweet clover hay at $10 per ton	"	1,440	1,440	1,440
Mineral mixture at 72 cents per cwt	"	283	280	276
Total quantity of meal consumed	"	2,841	2,841	2,841
Total cost of all feed and minerals	$	46 94	44 53	44 50
Meal required per 100 pounds gain	lb.	232	303	342
Cost of all feed per 100 pounds gain	$	3 84	4 74	5 36
Returns per head at estimated value of $7.50 per 100 pounds less cost of all feed	$	8 68	6 80	5 98

The total gain, the meal required per 100 pounds gain and the returns over cost of feeds are all in favour of the oat and shorts mixture, with the oat and barley mixture ranking second and the oat lot showing least favourable results.

COD LIVER OIL FOR WINTER-FEEDING

During the winter of 1927-28 cod liver oil was tested for the second time at this Station as a supplement to the winter ration. In the first test the cod liver oil increased the net returns by only 18 cents per pig. The second test was merely a duplicate of the first. In each case one-half ounce of cod liver oil was fed per pig daily.

COD LIVER OIL FOR WINTER-FEEDING

——		Check lot	Cod liver oil
Number of pigs in each lot		10	10
Initial weight of each lot	lb.	560	562
Initial average weight	"	56	56
Final weight of each lot	"	1,390	1,377
Final average weight	"	139	138
Total gain per lot (96 days)	"	830	815
Average gain per pig	"	83	82
Average daily gain per pig	"	0·86	0·85
Oat chop consumed at 1 cent per pound plus $1.50 per ton for crushing	"	2,270	2,270
Cod liver oil at $2.25 per gallon	gal.	.....	2·25
Oilcake meal at $2.70 per cwt	lb.	142·5	142·5
Tankage at $2.25 per cwt	"	142·5	142·5
Bran at $1.35 per cwt	"	285	285
Sweet clover hay at $10 per ton	"	1,440	1,440
Mineral mixture at 72 cents per cwt	"	27·6	26·1
Total quantity of meal consumed	"	2,841	2,841
Total cost of all feed and minerals	$	44 50	49 45
Meal required per 100 pounds gain	lb.	342	349
Cost of all feed per 100 pounds gain	$	5 36	6 07
Returns per head at estimated value of $7.50 per cwt. less cost of all feed	$	5 98	5 38

In this test the cod liver oil has not shown any benefits, and by increasing the total cost of feeds the net returns are below the check lot which received no oil.

TANKAGE VS. MILK POWDER

A winter-feeding experiment was conducted during the winter of 1927-28, for the purpose of testing skim-milk powder as a protein supplement for pigs in winter. It was compared with tankage pound for pound, as there was very little difference in protein content of the two supplements.

TANKAGE VS. MILK POWDER

——		Tankage	Milk powder
Number of pigs in each lot		10	10
Initial weight of each lot	lb.	561	559
Initial average weight	"	56	56
Final weight of each lot	"	1,500	1,511
Final average weight	"	150	151
Total gain per lot (96 days)	"	939	952
Average gain per pig	"	94	95
Average daily gain per pig	"	0·98	0·99
Oat chop consumed at 1 cent per pound plus $1.50 per ton for crushing	"	1,635	1,635
Barley chop consumed at 1 cent per pound plus $1.50 per ton for crushing	"	635	635
Milk powder at $13.50 per cwt	"	.....	142·5
Oilcake meal at $2.70 per cwt	"	142·5	142·5
Tankage at $2.25 per cwt	"	142·5	.....
Bran at $1.35 per cwt	"	285	285
Sweet clover hay at $10 per ton	"	1,440	1,440
Mineral mixture at 72 cents per cwt	"	280	283
Total quantity of meal consumed	"	2,841	2,841
Total cost of all feed and minerals	$	44 53	60 58
Meal required per 100 pounds gain	lb.	303	298
Cost of all feed per 100 pounds gain	$	4 74	6 36
Returns per head at estimated value of $7.50 per cwt. less cost of all feed	$	6 80	5 27

The total gain, and the meal required per 100 pounds gain are both in favour of the milk powder, but on account of the high price of milk powder the net returns are low. The test indicates that milk powder would be satisfactory as a protein supplement if it could be purchased at the same price as tankage.

STRAW SHED VS. PIGGERY FOR WINTER QUARTERS

Several tests have been made at Scott in comparing winter quarters for swine. The piggery, which is a double-wall building, has been somewhat disappointing and, although pigs fed outside sometimes show the effects of exposure, the final returns are usually in their favour.

STRAW SHED VS. PIGGERY FOR WINTER QUARTERS

—		Straw shed	Piggery
Number of pigs in each lot		10	10
Initial weight of each lot	lb.	561	561
Initial average weight	"	56	56
Final weight of each lot	"	1,943	2,077
Final average weight	"	194	208
Total gain per lot (137 days)	"	1,382	1,516
Average gain per pig	"	138	152
Average daily gain per pig	"	1·0	1·1
Oat chop consumed at 1 cent per pound, plus $1.50 per ton for crushing	"	3,078	3,078
Shorts consumed at $1.45 per cwt	"	1,779	1,779
Oilcake meal at $2.70 per cwt	"	306	306
Tankage at $2.25 per cwt	"	306	306
Bran at $1.35 per cwt	"	612	612
Sweet clover hay at $10 per ton	"	2,054	2,054
Mineral mixture at 72 cents per cwt	"	286	399
Total quantity of meal consumed	"	6,081	6,081
Total cost of all feed and minerals	$	94 63	95 44
Meal required per 100 pounds gain	lb.	440	401
Cost of all feed per 100 pounds gain	$	6 85	6 30
Returns per head at $10 per cwt. less cost of all feed	$	9 97	11 23

In this test the exception to the rule is seen and the lot in the piggery has done slightly better than the outside lot. It should be stated, however, that in some years serious crippling has occurred in the piggery; but this has never happened at this Station with pigs running in a straw-shed. It is considered that frequent exposure to direct sunlight, daily exercise and a dry comfortable bed are the main essentials to successful wintering.

SUMMER-FEEDING EXPERIMENTS—PRELIMINARY TRIAL OF ADVANCED REGISTRY POLICY

During the summer of 1928 the Station co-operated with the Dominion Live Stock Branch in making a preliminary test of strains of swine. Thirteen litters, a total of ninety-six hogs, were selected for this work and data have been tabulated separately for each litter from weaning time until each carcass was cut in the packing-plant. The purpose of the scheme was to determine the advisability of establishing Advanced Registration for swine.

Much interesting data have been compiled from the test both in the feeding trial and in the subsequent slaughter test. Certain litters were found to have made greater average daily gains and thus were ready for market at an earlier age than other litters. It was also found that certain litters required less feed per pig to reach market weights and the slaughter test revealed a variation among the litters in proportion of fat and lean meat and in the firmness of fat.

Thus it would seem that there are certain strains of swine which will produce hogs of market weights more economically and at an earlier date than the pigs of other strains; and that there is also a variation in the resulting carcasses produced by these strains.

TANKAGE VS. MILK POWDER

During the summer of 1928 a test was made to compare the value of tankage and a skim-milk powder as protein supplements for growing swine. The tankage was 43 per cent protein and the milk powder was 38 per cent protein. Each supplement was fed at the rate of 10 per cent of the meal mixture during the first part of the test, and 5 per cent for the remainder of the period.

TANKAGE VS. MILK POWDER

—		Milk Powder	Tankage
Number of pigs in each lot		10	10
Initial gross weight of each lot	lb.	440	441
Initial average weight	"	44	44·1
Final gross weight of each lot	"	1,839	1,843
Final average weight per pig	"	183·9	184·9
Total gain per lot during test (108 days)	"	1,399	1,402
Average gain per pig	"	139·9	140·2
Average daily gain per pig	"	1·30	1·30
Oat chop consumed at 1·79 cents per pound	"	2,079	2,079
Barley chop consumed at 1·6 cents per pound	"	1,796	1,796
Shorts consumed at 1·7 cents per pound	"	195	195
Milk powder at $13.50 per cwt.	"	317	.....
Tankage consumed at 2·75 cents per pound	"	.....	317
Wheat screenings at 1 cent per pound	"	195	195
Total quantity of meal consumed	"	4,582	4,582
Meal required per 100 pounds gain	"	328	327
Total cost of feed	$	114 01	79 93
Cost of feed per 100 pounds gain	$	8 15	5 70
Returns per head at $8.50 per cwt. less cost of feed	$	4 23	7 67

It will be noted that the total gain per lot was practically the same for the two lots; also the meal required per 100 pounds gain was equal. The results seem to indicate that the supplements were about equal in feeding value pound for pound. The only objection to the use of milk powder is the prohibitive price of the product which, alone, accounts for the lower returns from this lot.

FIELD HUSBANDRY

CROP ROTATIONS

Rotation is the name given to a cropping system whereby different crops are grown on the same land in a definite order and in recurring succession. All the crops in a rotation are grown in the same year. Any rotation for farm purposes requires as many fields as there are years in a rotation.

At this Station there are nine rotations, ranging in duration from two to eight years. Approximately two hundred acres are used for this work. These rotations include grain and summer-fallow, grain, hay and summer-fallow, and grain, hay, sunflowers and summer-fallow. The central object behind this work is to find out which order of crops is adapted for farmers of this area. The effect of these rotations on soil fertility is checked by soil analysis from time to time.

Accurate records are kept of all items of expense and the amounts received for crops produced. Manual labour was charged at the rate of 30 cents per hour, with 40 cents per hour in harvest time. Horse labour was calculated at 8

cents per hour. Below will be found a list of the cost and return values used for 1928. Short summaries, in tabular form, are given for all rotations; but further details will be supplied on request. The profits shown represent net profits, as all expenses have been deducted.

COST AND RETURN VALUES 1928

Field work	Number of horses	Size of implement	Acres per day	Cost per acre
				$
Cultivating	6	9-foot	14·0	0 56
Cultivating	2			0 46
Cutting grain	4	8-foot	15·0	0 48
Cutting hay	2	5- "	10·0	0 46
Disking	6	8- "	14·0	0 56
Harrowing	6	24- "	52·0	0 15
Packing	6	15- "	29·0	0 27
Ploughing (sod)	5	Two fourteen-inch	3·96	1 77
Ploughing (stubble)	5	"	4·81	1 46
Raking hay	2	8-foot	20·0	0 23
Scuffling	1			0 57
Seeding	4	10-foot	20·6	0 30

COST VALUES

Ensiling sunflowers	per ton	$1 00
Machinery	per acre	1 35
Manure	per ton	1 00
Rent	per acre	2 60
Seed barley	per bushel	1 00
Seed oats	"	0 85
Seed rye	"	1 00
Seed wheat	"	1 50
Sunflower seed	per pound	0 13
Stacking hay	per ton	1 50
Sweet clover seed	per pound	0 14
Threshing barley	per bushel	0 12
Threshing oats	"	0 08
Threshing rye	"	0 14
Threshing wheat	"	0 14
Twine	per pound	0 14
Western rye grass seed	"	0 10

RETURN VALUES

Wheat	per bushel	$0 90
Barley	"	0 55
Barley straw	per ton	2 00
Oats	per bushel	0 45
Oat straw	per ton	2 00
Pasture (cow or horse)	per month	1 20
Pasture (sheep)	"	0 30
Rye	per bushel	0 80
Sunflower silage	per ton	3 00
Sweet clover hay	"	10 00
Western rye hay	per bushel	10 00

TWO-YEAR ROTATION

Summer-fallow.
Wheat.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average eight years			1928	Average eight years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow				7 66	−7 66	−8 05
Wheat	28·3	25·1	25 47	12 80	12 67	13 39
Average per acre			12 74	10 23	2 51	2 67

This two-year rotation, with only one crop, has to absorb all the summer-fallow charges before showing a profit. This year, the profit per acre has been $2.51 and the average profit for eight years has been $2.67. Over this period the average cost of producing a bushel of wheat has been 94 cents.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Wheat.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average seventeen years			1928	Average seventeen years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow				6 90	−6 90	−6 84
Wheat	22·7	19·1	20 43	11 55	8 88	10 03
Wheat	17·3	17·3	15 57	11 96	3 61	6 56
Average per acre			12 00	10 14	1 86	3 25

In this rotation one-third of the land is summer-fallowed each year and two-thirds cropped. Our results show an average profit of $3.25 per acre for this rotation covering the past seventeen years. In the Prairie Provinces, this system of cropping is used by the majority of farmers. There is a general demand for a change from this rotation because of increased weed growth and decreased profits. Our rotation studies are designed to help solve such difficulties. A comparison of this rotation and a six-year rotation will be found in the table comparing a common grain rotation with a grain and hay rotation on page 22.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Fall rye.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average five years			1928	Average five years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow				6 98	−6 98	−8 45
Wheat	25·8	23·4	23 22	12 15	11 07	13 56
Fall rye	14·6	20·5	11 68	8 78	2 90	5 75
Average per acre			11 63	9 30	2 33	3 62

Two ideas were in mind when laying out this rotation. The first was to try fall rye as an aid against soil drifting, and the second to test the possibility of using a biennial crop in the control of annual weeds. Only one ploughing is given every three years as the fall rye is sown on disked wheat stubble after

the binder. In five years the average profit from this rotation has been $3.62 per acre. A striking disadvantage of this crop plan is that small percentages of fall rye are found each year in the wheat crop. It is apparent from field observation that the fall rye is not keeping the annual weeds in check. This rotation has not been under test a sufficient length of time to give a definite opinion on its merits for our conditions.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Sweet clover.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average seven years			1928	Average seven years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow	.....	.....	.....	6 98	−6 98	−8 04
Wheat	22·3	21·8	20 07	10 88	9 19	11 41
Sweet clover	tons 1·06	tons 1·36 (6-yrs.)	10 60	8 33	2 27	4 30
Average per acre	.....	.....	10 22	8 73	1 49	2 56

Testing the practical usefulness of using sweet clover as a second crop after fallow in the common three-year rotation is an object of this experiment. A perfect stand of sweet clover is not always obtained. In years when the stand is thin certain weeds multiply rapidly. The larger part of the profit in this rotation is made from the wheat. Covering the past seven years, the average profit for the rotation has been $2.56 per acre.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Oats.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average seven years			1928	Average seven years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow	.....	.....	.....	6 98	−6 98	−8 04
Wheat	20·6	24·1	18 54	11 39	7 15	12 75
Oats	54·0	52·6	27 16	13 94	13 22	9 54
Average per acre	.....	.....	15 23	10 77	4 46	4 75

Oats are a second crop after fallow in this three-year rotation. Some advantage in weed destruction has been gained by substituting oats for wheat in this rotation. Spring ploughing for oats was done when a large percentage of the weeds had germinated. Oats sown immediately usually make their growth

without any set-back and thus hold in check many weeds that start after seeding. In the past seven years for this rotation, the profit has been $4.75 per acre, which is much greater than the profit for the previous rotation where sweet clover is grown in place of oats.

FOUR-YEAR ROTATION

Summer-fallow.
Wheat.
Oats (seeded down).
Sweet clover.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average three years			1928	Average three years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow				7 54	−7 54	−6 90
Wheat	38·2	29·8	34 38	13 96	20 42	18 99
Oats	42·0	44·9	21 12	11 74	9 38	11 63
	tons	tons				
Sweet clover	1·78	1·18	17 80	9 74	8 06	4 24
Average per acre			18 33	10 75	7 58	6 99

One purpose of this rotation is to find out the value of sweet clover in a four-year rotation. Little can be said concerning its ability to fight weeds because it was commenced only three years ago on clean land. For this short period, the average profit on this rotation has been $6.99 per acre. It should not be compared with other rotations already discussed because these have been in operation for a longer time. A reasonable comparison can be made with the rotation immediately following, where grain in rows is substituted for summer-fallow.

FOUR-YEAR ROTATION

Intertilled wheat.
Wheat.
Oats (seeded down).
Sweet clover.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average three years			1928	Average three years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Wheat intertilled	19·3	18·9	17 37	11 63	5 74	9 95
Wheat	36·9	25·3	33 21	13 78	19 43	14 22
Oats	40·9	44·1	20 57	11 65	8 92	11 28
	tons	tons				
Sweet clover	1·0	0·92	10 00	8 39	1 61	2 09
Average per acre			20 29	11 36	8 93	9 39

By substituting grain in rows for summer-fallow in this four-year rotation, an increase of $2.40 in the average profit in the same three years has been obtained. Farmers attracted by the profits on this rotation have tried it but were forced to discontinue grain in rows because of the rapid multiplication of weeds. At this this Station, weeds in this rotation have not been troublesome. In addition, wheat after grain in rows has matured fairly evenly. From observations and results obtained by farmers, it is evident that this rotation cannot be used on weedy land.

Six-Year Rotation

Summer-fallow.
Wheat.
Wheat.
Oats (seeded down).
Pasture.
Hay.

Summary of Yields, Value and Profit and Loss per acre

Crop	Yield per acre		Value of crop 1928	Cost of production	Profit or loss per acre	
	1928	Average seventeen years			1928	Average seventeen years
	bush.	bush.	$	$	$	$
Summer-fallow			1 59	6 73	−5 14	−6 31
Wheat	25·6	24·9	23 04	12 23	10 81	15 84
Wheat	23·7	20·4 (11 yrs.)	21 33	13 01	8 32	6 77
Oats	59·7	48·4	30 03	14 02	16 01	8 36
Pasture			3 75	3 62	0 13	2 04
	tons	tons				
Hay	1·05	0·92 (13 yrs.)	10 50	7 24	3 26	2 05
Average per acre			15 04	9 48	5 56	4 78

This six-year rotation is designed to compare its profit and usefulness over a long period of years against the common straight grain rotation. Oats are seeded at the rate of 2 bushels with 12 pounds of Grazier western rye grass and 6 pounds of Arctic sweet clover per acre. To obtain even distribution of all seed, sufficient for each acre is mixed, and added to the drill so as to have it about one-third full. To distribute all this seed at the required rate, the drill is actually set at 2 bushels and 3 pecks for oats. Seeding down in this rotation has always resulted in a good catch of sweet clover and western rye grass. Before ploughing the summer-fallow it is pastured until approximately the middle of June. Profit allowed for pasture reduces the cost of summer-fallow. In order that the reader may determine the merits of this rotation, it has been compared with the common grain rotation in the following table:—

Common Grain Rotation versus a Grain and Hay Rotation

Number of years averaged	Summer-fallow, wheat and wheat			Summer-fallow, wheat, wheat, oats, hay and pasture		
	Cost of summer-fallow	Yield of fallow wheat	Profit in rotation	Cost of summer-fallow	Yield of fallow wheat	Profit in rotation
	$ cts.	bush.	$ cts.	$ cts.	bush.	$ cts.
16 years (1913-1928)	6 89	18·9	3 26	6 40	24·5	4 39
8 years (1913-1920)	5 69	20·1	5 22	6 49	24·8	4 59
8 years (1921-1928)	8 09	17·6	1 29	6 31	24·1	4 19

A study of the above table reveals some interesting facts. In the common grain rotation the cost of summer-fallowing has increased during the past eight years, but in the six-year rotation this cost is remaining practically steady. By far the most outstanding feature in this comparison is the decrease in net profit for the three-year rotation from $5.22 in the first eight years to $1.29 per acre for the past eight years. Profit on the six-year rotation has remained practically the same. This comparison is especially valuable when it is considered that neither of these rotations have ever received manure.

EIGHT-YEAR ROTATION

Summer-fallow.
Wheat.
Wheat.
Summer-fallow (manured).
Sunflowers.
Barley (seeded down).
Hay.
Hay.

SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
	1928	Average seventeen years			1928	Average seventeen years
	bush.	bush.	$ cts.	$ cts.	$ cts.	$ cts.
Summer-fallow	.....	.....	.....	8 12	−8 12	−7 71
Wheat	19·3	22·3	17 37	13 57	3 80	11 53
Wheat	22·0	17·3	19 80	15 31	4 49	5 44
Summer-fallow	.....	.....	.....	6 98	−6 98	−7 71
	tons	tons				
Sunflowers	11·36	9·65 (9 yrs.)	34 08	23 62	10 46	9 46
	bush.	bush.				
Barley	40·0	28·9 (16 yrs.)	24 92	15 76	9 16	3 64
	tons	tons				
Hay	2 96	1·29 (16 yrs.)	29 60	12 50	17 10	3 55
Hay	0·62	1·11 (13 yrs.)	6 20	8 99	−2 79	1 73
Average per acre	.....	.....	16 50	13 11	3 39	2 49

This is essentially a mixed farming rotation. Each field is manured once in eight years at fifteen tons per acre when summer-fallowed before cropping to sunflowers. For this reason, it is not comparable with the six-year rotation which received no manure.

CULTURAL EXPERIMENTS

Field work reported under this title involves methods of preparing land for crops. These include treatment of summer-fallow, stubble treatment, manures, fertilizers, summer-fallow substitutes, soil packing and straw mulch for grain. There are twelve experiments in operation. One-fortieth-acre plots separated by 4-foot pathways are used. Every known effort is made to have all conditions correspond with those in the field. Borders of plots are removed at the time of harvesting. In tables presented, average yields are given for the number of years in which the experiment has been in operation.

METHODS OF SUMMER-FALLOWING

The object of this experiment is to test certain methods of handling summer-fallow.

A number of plots are ploughed in June at different depths and another group, handled the same way, are backset in September. Cultivation only and using an annual pasture after ploughing are compared with the above. Different dates of ploughing summer-fallow are tested. Four plots are ploughed at the same depth but receive different treatments previous to being summer-fallowed. The rotation used is summer-fallow, wheat, oats on spring-ploughed stubble.

SUMMER-FALLOW TREATMENT

Project No. F 144

Plot No.	Plot treatment	Average yield per acre	
		Wheat 13 years	Oats 14 years
		bush.	bush.
1	Fallow ploughed 4 inches in June. Wheat stubble ploughed 6 inches	27·9	61·2
2	" 6 " " " " 6 "	26·5	59·8
3	" 8 " " " " 6 "	27·7	59·5
4	Fallow ploughed 4 inches in June and 4 inches in September. Wheat stubble ploughed 6 inches	27·6	58·0
5	Fallow ploughed 6 inches in June and 6 inches in September. Wheat stubble ploughed 6 inches	26·7	56·8
6	Fallow ploughed 8 inches in June and 8 inches in September. Wheat stubble ploughed 6 inches	26·1	57·2
7	Fallow ploughed 6 inches in June and 4 inches in September. Wheat stubble ploughed 6 inches	28·7	56·7
8	Fallow ploughed 4 inches in June and 6 inches in September. Wheat stubble ploughed 6 inches	31·2	55·6
10	Fallow ploughed 5 inches in June, seeded with ½ bushel oats per acre and pastured. Wheat stubble ploughed 6 inches	25·8	53·6
11	Fallow ploughed 6 inches May 15. Wheat stubble ploughed 6 inches	31·7	56·9
12	Fallow ploughed 6 inches June 15. Wheat stubble ploughed 6 inches	29·5	53·1
13	Fallow ploughed 6 inches July 15. Wheat stubble ploughed 6 inches	26·3	52·9
14	Cultivated in fall before summer-fallowing 6 inches in June. Wheat stubble ploughed 6 inches	27·2	53·2
15	Fallow ploughed 4 inches in fall before summer-fallowing 6 inches in June. Wheat stubble ploughed 6 inches	28·0	54·7
16	Fallow ploughed 6 inches in June. Wheat stubble ploughed 6 inches	29·1	55·1
17	Cultivated in spring before summer-fallowing 6 inches in June. Wheat stubble ploughed 6 inches	29·6	55·0

Indications are that there is no advantage in ploughing summer-fallow deeper than 4 inches. Backsetting in September has not given sufficient economic advantage to be of practical importance in the harvest season when high wages are paid. Cultivating only to control weeds is apparently of equal value, but only four years' work has been done on this method. Pasturing a light seeding of oats on summer-fallow has resulted in the lowest yield of wheat. Early ploughing of summer-fallow has given highest yields. Tillage operations previous to ploughing summer-fallow have not materially affected results.

SUMMER-FALLOW SUBSTITUTES

Object of Experiment.—To determine the practical usefulness of using intertilled crops as a substitute for summer-fallow.

Plan of Experiment.—A two-year rotation is followed, substitutes and wheat. The wheat stubble is spring-ploughed for the fallow substitutes, and the row-crops are cultivated as necessary during the summer to control weeds. In preparation for the wheat crop the following year, the row-crop stubble is double-disked before seeding. Summer-fallow is used as a check.

SUMMER-FALLOW SUBSTITUTES
Project No. F 145

Plot treatment	Average yield per acre	
	Substitutes 7 years	Wheat 6 years
	bush.	bush.
Summer-fallow ploughed 6 inches deep in June	.....	27·9
Oats sown in 2-drill groups 36 inches apart	43·4	26·3
Oats sown in 3-drill groups 36 inches apart	50·8	25·9
Barley sown in 2-drill groups 36 inches apart	18·0	24·8
Barley sown in 3-drill groups 36 inches apart	23·5	25·6
Wheat sown in 2-drill groups 36 inches apart	13·8	24·8
Wheat sown in 3-drill groups 36 inches apart	16·7	23·3
Potatoes sown in rows 36 inches apart	167·6	26·8
	tons 6-year average	
Corn sown in rows 36 inches apart	2·69	27·9
		5-year average
Sunflowers sown in rows 36 inches apart	11·68	22·3

Cultivation on left vs. no cultivation on right. See table on page 26

Discussion of Results.—Triple rows show an increase in yield over double rows for the three classes of grain shown. The difference in yields of wheat following grain in rows has not been pronounced. Yields of wheat following summer-fallow, potatoes and corn have been very similar and slightly higher than grain in rows. It should be noted that the corn has been an economic failure. Wheat following sunflowers has yielded the lowest with the summer-fallow substitutes tested.

STUBBLE TREATMENT FOR WHEAT AND OATS

Object of Experiment.—To determine the best method of treating wheat stubble for wheat and oats.

Plan of Experiment.—Wheat is grown on summer-fallow, on all plots, to provide uniform stubble land for the various stubble treatments tested for both wheat and oats.

STUBBLE TREATMENT FOR WHEAT AND OATS
Project No. F 146

Plot No.	Second crop after fallow	Plot treatment	Yield per acre	
			Yield 1928	Average yield 14 years
			bush.	bush.
1	Wheat.....	Stubble ploughed 4 inches in autumn.....	24·6	17·2
2	"	Stubble disked in autumn.....	25·7	18·1
3	"	Stubble burned before disking in autumn.....	25·7	20·0
4	"	Stubble burned before ploughing 4 inches in autumn.....	21·0	18·7
5	"	Stubble burned in spring—seeded without further cultivation..	26·5	21·5
6	"	Stubble ploughed 4 inches in spring.....	24·6	20·4
7	"	Stubble disked at cutting time—ploughed 4 inches in spring....	23·0	19·1
8	"	Stubble disked at cutting time—ploughed 4 inches in fall.....	24·6	18·2
9	"	Stubble ploughed 4 inches in autumn.....	20·6	18·1
10	"	Stubble ploughed 4 inches in spring.....	23·8	20·5
11	Oats.....	Stubble ploughed 4 inches in autumn.....	59·4	50·3
12	"	Stubble ploughed 4 inches in spring.....	69·9	58·2
13	"	Stubble cultivated in spring—seeded at once.....	65·0	53·0
				5-year average
14	Wheat.....	Stubble cultivated shallow in autumn—No further cultivation..	14·3	16·2
15	"	Stubble cultivated deeply in autumn—No further cultivation...	19·4	19·2
16	"	Seeded in stubble in spring—No cultivation.....	5·6	4·8

Discussion of Results.—This experiment forcefully illustrates the importance of giving some treatment to stubble in preparation for grain, as exhibited by the low yield obtained when no treatment is given. Deep cultivation in the fall has given higher yields than shallow cultivation. Differences in yield between spring and fall ploughing for wheat are not pronounced, but any advantage recorded favours the spring operation. Stubble burning has shown a tendency to increase yields. Spring ploughing for oats has shown a marked increase in yield over fall ploughing, with spring cultivation intermediate in this respect.

DEPTH OF PLOUGHING

Objects of Experiment.—To determine the best depths for ploughing summer-fallow and to test the value of subsoiling.

Plan of Experiment.—Summer-fallow is ploughed in June from 3 to 8 inches deep, and in addition depths from 5 to 8 inches are subsoiled below the sole of the furrow. Additional necessary cultivation is given throughout the season to control weeds. The rotation used is summer-fallow, wheat, oats on spring-ploughed stubble.

DEPTH OF PLOUGHING SUMMER-FALLOW
Project No. F 148

Plot No.	Plot treatment	Average yield per acre 14 years	
		Wheat	Oats
		bush.	bush.
1	Fallow ploughed 3 inches deep. Stubble 3 inches.....	24·6	51·7
2	Fallow ploughed 4 inches deep. Stubble 4 inches.....	26·0	53·3
3	Fallow ploughed 5 inches deep. Stubble 5 inches.....	25·3	52·4
4	Fallow ploughed 6 inches deep. Stubble 5 inches.....	24·6	51·0
5	Fallow ploughed 7 inches deep. Stubble 5 inches.....	24·8	50·8
6	Fallow ploughed 8 inches deep. Stubble 5 inches.....	24·1	51·5
7	Fallow ploughed 5 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches.....	25·6	54·1
8	Fallow ploughed 6 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches.....	25·9	54·0
9	Fallow ploughed 7 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches.....	25·6	55·1
10	Fallow ploughed 8 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches.....	24·5	47·9

Discussion of Results.—Covering a period of fourteen years, the results show there is no advantage in ploughing summer-fallow deeper than 4 inches, and that subsoiling does not increase yield, much less pay for the extra cost involved.

SOIL PACKING

Objects of Experiment.—To determine the best time to pack and the best type of packer to use.

Plan of Experiment.—Summer-fallow spring ploughing and fall ploughing are packed at different times with two different types of packers, and the yields are compared with a plot which receives an extra stroke of the harrow in place of packing.

PACKING SUMMER-FALLOW

Project No. F 149

Plot No.	Crop	Plot treatment	Yield per acre	
			Yield 1928	Average yield 6 years
			bush.	bush.
2	Wheat....	Extra stroke of harrow after ploughing	35·6	27·9
3	"	Culti-packed after ploughing	37·2	29·9
4	"	Surface-packed after ploughing	38·8	30·5
5–18	"	Extra stroke of harrow in spring before seeding	40·0	31·7
6–19	"	Culti-packed in spring before seeding	37·0	30·9
7–20	"	Surface-packed in spring before seeding	36·3	31·7
8–21	"	Harrowed after seeding	36·2	31·4
9–22	"	Culti-packed after seeding	39·2	30·9
10–23	"	Surface-packed after seeding	38·4	30·5
11–24	"	Harrowed before and after seeding	39·6	29·9
12–25	"	Culti-packed before and after seeding	40·6	30·0
13–26	"	Surface-packed before and after seeding	37·0	30·1
15	"	Harrowed after ploughing and after seeding	30·5	30·4
16	"	Culti-packed after ploughing and after seeding	34·1	31·4
17	"	Surface-packed after ploughing and after seeding	36·4	30·6

Discussion of Results.—While slight fluctuations appear from year to year, depending on the character of the season, the average results covering a period of six years show no advantage for packing over harrowing.

PACKING OF SPRING PLOUGHING

Project No. F 149

Plot No.	Crop	Plot treatment	Yield per acre	
			Yield 1928	Average yield 7 years
			bush.	bush.
2–11	Wheat....	Harrowed before and after seeding	31·7	23·8
3–12	"	Culti-packed before and after seeding	31·5	25·9
4–13	"	Surface-packed before and after seeding	31·5	24·2
5	"	Harrowed before seeding	32·9	25·0
6	"	Culti-packed before seeding	32·5	25·2
7	"	Surface-packed before seeding	33·3	26·1
8	"	Harrowed after seeding	33·7	24·7
9	"	Culti-packed after seeding	35·6	26·2
10	"	Surface-packed after seeding	32·5	24·5

Discussion of Results.—Field observation indicates improved stand in certain seasons and smoother surface after packing spring-ploughed stubble for wheat. The differences in yields obtained in this experiment do not show a material advantage for packing as compared with harrowing.

PACKING FALL PLOUGHING

Project No. F 149

Plot No.	Crop	Plot treatment	Yield per acre	
			Yield 1928	Average yield 7 years
			bush.	bush.
15	Wheat	Harrowed after ploughing	30·1	21·4
16	"	Culti-packed after ploughing	28·1	22·7
17	"	Surface-packed after ploughing	29·7	22·8
18	"	Harrowed before seeding	32·9	24·5
19	"	Culti-packed before seeding	30·5	21·4
20	"	Surface-packed before seeding	29·7	22·8
21	"	Harrowed after seeding	28·1	21·8
22	"	Culti-packed after seeding	27·7	22·2
23	"	Surface-packed after seeding	26·9	20·0
24	"	Harrowed before and after seeding	26·9	20·8
25	"	Culti-packed before and after seeding	27·7	21·3
26	"	Surface-packed before and after seeding	28·9	20·8

Discussion of Results.—The more expensive operations of double-packing have not justified the cost involved. Advantage of spring ploughing over fall ploughing for stubble is shown in this experiment.

APPLYING BARNYARD MANURE

Object of Experiment.—To determine the value of barnyard manure for wheat, oats and barley, and to compare different times and methods of applying it.

Plan of Experiment.—Fresh and rotted manure are applied to different plots, and at different times of the year, at the rate of 12 tons per acre. A charge of $1 per ton is made for the manure with the cost divided equally between the two crops. Return values used for grain are given in the list of cost and return values for 1928.

MANURE FOR WHEAT—SUMMER-FALLOW, WHEAT, WHEAT

Project No. F 189

Plot No.	Plot treatment	Average per acre 14 years		
		First crop after manure	Second crop after manure	Value of crop less cost of manure
		bush.	bush.	$
1	Fresh manure in winter on first year stubble	19·2	23·5	13 22
3	Rotted manure after seeding second crop on spring ploughing	20·4	25·9	14 84
5	No manure—Spring ploughed	19·2	22·5	18 77
6	Rotted manure before ploughing first year stubble in fall	24·0	25·6	16 32
7	Rotted manure before ploughing first year stubble in spring	26·6	27·5	18 35

Discussion of Results.—There is practically no difference in yield following fresh manure and no manure, but when cost is considered, no manure has the advantage for the years shown. Ploughing under rotted manure has given the highest yields, with the advantage in favour of spring ploughing, but the ultimate value will be determined in future years.

MANURE FOR BARLEY—SUMMER-FALLOW, WHEAT, BARLEY

Project No. F 190

Plot No.	Plot treatment	Average per acre 14 years		
		First crop after manure	Second crop after manure	Value of crop less cost of manure
		bush.	bush.	$
1	Fresh manure in winter on first year stubble	28·1	24·0	12 53
3	Rotted manure after seeding second crop on spring ploughing	24·6	25·4	12 20
5	No manure—Spring ploughed	22·6	22·7	10 43
6	Rotted manure before ploughing first year stubble in fall	30·0	26·1	14 00
7	Rotted manure before ploughing first year stubble in spring	30·9	28·0	15 10

Discussion of Results.—While top dressings of rotted manure and the ploughing under of a winter application of fresh manure have caused fluctuations in yields of barley, the value of crops from the no-manure treatment has been greater than that of those receiving manurial treatment over a period of fourteen years. Where viable weed seeds are present in fresh manure, it should be rotted before applying. Ploughing under rotted manure has given a marked increase in yield.

MANURE FOR OATS—SUMMER-FALLOW, WHEAT, OATS

Project No. F 191

Plot No.	Plot treatment	Average per acre 14 years		
		First crop after manure	Second crop after manure	Value of crop less cost of manure
		bush.	bush.	$
1	Fresh manure in winter on first year stubble	56·1	26·9	18 73
3	Rotted manure after seeding second crop on spring ploughing	53·9	26·2	17 92
5	No manure—spring ploughed	50·4	22·2	21 33
6	Rotted manure before ploughing first year stubble in fall	58·7	25·4	18 64
7	Rotted manure before ploughing first year stubble in spring	60·7	26·5	19 59

Discussion of Results.—The reaction of oats to manure has been similar to that of barley, but the crop returns for the rotation are higher in all cases when oats are used.

COMMERCIAL FERTILIZERS FOR FIELD CROPS

Object of Experiment.—To determine the value of commercial fertilizer for field crops.

Plan of Experiment.—In a rotation of wheat, oats, grass and corn, commercial fertilizers are applied, singly and in combination, to the corn crop.

COMMERCIAL FERTILIZERS FOR FIELD CROPS

Project No. F 193

Plot No.	Crop	Kind of fertilizers applied	Rate of application per acre	Yield per acre	
				Yield 1928	Average yield 3 years
			lb.	bush.	bush.
	Wheat	Check plots	None	30·0	25·0
2	"	Nitrate of soda	320	30·2	23·8
3	"	Superphosphate	600	38·0	32·9
4	"	Muriate of potash	200	33·7	27·6
6	"	Nitrate of soda	320		
		Superphosphate	600	41·1	31·7
		Muriate of potash	200		
7	"	Nitrate of soda	320		
		Superphosphate	600	41·5	31·9
8	"	Nitrate of soda	320		
		Muriate of potash	200	28·6	25·0
9	"	Superphosphate	600		
		Muriate of potash	200	39·6	33·6
11	"	Basic slag	1,000	43·5	35·4
12	"	Seeded to sweet clover in place of western rye grass	.....	29·4	26·4
13	"	Seeded to sweet clover in place of western rye grass	.....	23·5	23·8
			tons		
14	"	Barnyard manure	16	32·9	31·8
15	"	Barnyard manure	8	36·4	26·7

Discussion of Results.—Nitrate of soda alone has not increased the yield of wheat and the same is true where sweet clover has been substituted for western rye grass. Muriate of potash alone, or in combination with nitrate of soda, has not materially influenced the yield of wheat. Superphosphate used alone or in any combination, including basic slag, has given a marked increase in yield.

CO-OPERATIVE SUPERPHOSPHATE EXPERIMENT FOR WHEAT

Plot treatment	Days to mature	Yield per acre	Weight per measured bushel after cleaning	Commercial grade
		bush.	lb.	No.
Summer-fallow				
Superphosphate 125 pounds per acre	114	42·4	66	3
Superphosphate 25 pounds per acre	118	38·4	64	4
Check	118	30·6	60	5
Spring-ploughed stubble				
Superphosphate 125 pounds per acre	111	34·3	64	3
Superphosphate 25 pounds per acre	118	29·5	65	3
Check	117	27·0	65	3

It is interesting to compare the results obtained in 1928 by using triple superphosphate, sown with a fertilizer drill on five-acre plots with wheat, to corroborate results obtained in Project No. F. 193. Soon after growth appeared a more vigorous and even stand was observed on treated plots, particulraly on summer-fallow. Advances in time of maturity, stronger root-system, increased yields and quality of grain apparently resulted from applications of superphosphate for wheat, particularly on summer-fallow land.

PLOUGHING DOWN OF GREEN MANURE CROPS

Object of Experiment.—To compare the increase in soil fertility, as shown by the increase in yields from ploughing under green crops, with that supplied by rotted manure.

Plan of Experiment.—Sweet clover and peas are grown in separate plots and ploughed down in July and compared with plots summer-fallowed in June with and without rotted manure ploughed under. The rotation is summer-fallow or legume crop, wheat, oats.

GREEN MANURE CROPS PLOUGHED UNDER

Project No. F. 194

Plot No.	Plot treatment	Average yield per acre	
		Wheat 6 years	Oats 5 years
		bush.	bush.
1	Sweet clover ploughed under in July	26·3	52·5
2	Peas ploughed under in early bloom	26·5	51·3
3	Peas ploughed under in late bloom	26·6	52·7
4–6	Fallow ploughed in June—cultivated	25·9	52·1
5	12 tons barnyard manure per acre applied before summer-fallowing in June	34·0	58·0

Discussion of Results.—Ploughing down sweet clover and peas has not given any material difference in yield over the plot receiving no manure, but the application of rotted manure has given a significant increase in yield of wheat. The same holds true for oats in the second crop after fallow, but the increase in yield for rotted manure is not so pronounced.

STRAW MULCH FOR WHEAT

Object of Experiment.—To determine the value of a straw mulch for wheat.

Plan of Experiment.—After wheat is seeded straw is scattered on the land at the rate of 1½ tons per acre on summer-fallow and spring-ploughed stubble for wheat. Check plots are seeded and left unmulched.

STRAW MULCH FOR WHEAT

Project No. F 243

Plot treatment	Average yield per acre 1927–28	
	Wheat on fallow	Wheat on spring-ploughed stubble
	bush.	bush.
Straw mulch 1½ tons per acre	32·2	28·2
Check	33·3	27·5

Discussion of Results.—No increase in yield has been obtained by using a straw mulch. It is an unsatisfactory practice from a standpoint of volunteer grain and dangerous for weed distribution.

HORTICULTURE

VEGETABLES

Two hundred and seventy-two varieties of vegetables involving twenty-eight kinds were under test in 1928. In the fruit plantation, there were one hundred and fifty varieties and cross-bred sorts of apples, crabs and plums, to which should be added sixty-five varieties of small fruits. Flowers included one hundred and twenty-eight perennials and one hundred and fifty annuals. One hundred and sixty-eight varieties of deciduous and evergreens were growing in the arboretum. Certain recommendations from our work will be found in the review of horticultural work presented.

ASPARAGUS

The first asparagus was cut on May 19, which was four days later than the preceding year. Cutting continued till June 6. Half of the asparagus bed, which was left uncut in 1927, gave increased size and strength of shoots in 1928. Varieties under test are Argenteuil and Colossal, both of which perform satisfactorily.

BEANS

Seventeen varieties of string beans were sown in the garden on May 22. Fifteen feet of each row were harvested for green beans and an equal distance left to ripen for seed. The first edible pods were ready for use on August 6. While good crops of green beans were harvested the portions remaining for seed were destroyed by frost on August 22. Varieties giving highest returns in order of yield were Challenge Black Wax, Wardwell Kidney Wax, Jones White, Stringless Green Pod and Davis White Wax.

Two varieties (Round Pod Kidney Wax and Stringless Green Pod) were used in a distance of planting test. Rows of each variety were thinned to 2, 4 and 6 inches. Both varieties, as in previous years, gave the highest yield from the 2-inch spacing and the largest spacing produced the lowest yield.

BEETS

Ten varieties of table beets were sown on May 11 and harvested on September 29. A strain of Detroit Dark Red, from the Central Experimental Farm, Ottawa, not only produced the highest yield, but was outstanding in quality, colour and uniformity. Recommended varieties are Detroit Dark Red, Crosby Egyptian and Flat Egyptian.

Commencing on May 3, seed of the leading variety was sown at ten-day intervals until June 22. Roots from the first sowing were large and coarse at harvest time, while those from the last seeding were about half-grown and at their best for table use. Over a period of years seeding beets the last week in May has given best results for domestic requirements.

BORECOLE OR KALE

Dwarf Green Scotch Curled and Tall Scotch Curled were grown in 1928. Tall Scotch produced a strong growth, but foilage was coarse and strong flavoured. Leaves of the Dwarf were finer and medium flavoured.

BRUSSELS SPROUTS

Only one variety of Brussels sprouts (Long Island Improved) was grown. The seed was started in the greenhouse early in April, and planted in the garden on June 11. The sprouts were not fit for use until October 3, and at that time were rather open, uneven in size and of poor quality. This vegetable is usually unsatisfactory at this Station.

CABBAGE

Twenty-two varieties and strains of green cabbage, and one of red, were started and set out on June 9. Considering the cool nights, the plants made good growth. The highest yielding varieties were Copenhagen Market, Brandon Market, Glory of Enkhuizen and Golden Acre. The first varieties ready for use were Flower of Spring and Jersey Wakefield.

Two varieties of cabbage were sown in the garden on six different dates from May 7 to June 28. Good cutting heads were obtained from the first sowing, While those from the last sowing were unprofitable, as is usually the case.

CAULIFLOWER

Five varieties and strains of cauliflower were started in the greenhouse and set out on the same dates as the cabbage. All varieties were backward due to dry weather in the middle of summer, and possessed a stronger flavour than usual. On August 14 Early Snowball was ready for use. This variety gives best results under our conditions.

CARROTS

Uneven germination was obtained from nine varieties of carrots sown on May 11. This necessitated a second seeding which was done on May 25. On July 3, plants were thinned to 3 inches in the rows. Harvesting was done on September 24. Chantenay, Market Garden, Danvers Half Long and Oxheart yielded, respectively, 69, 66, 64 and 57 pounds per 30-foot row. Short Horn, while yielding only 50 pounds for the same area compared favourably in quality.

Dates of seeding tests were conducted with the Chantenay variety. Commencing on May 3 seed was sown, with ten-day intervals, on six different dates. Excellent roots were obtained from sowings made up to the end of May; but roots from later sowings were unsatisfactory.

CELERY

Fourteen varieties of celery, and one of celeriac, were tested. Seed was sown in the greenhouse on March 23. The plants were transplanted in the garden on June 21 six inches apart in rows of shallow trenches until the plants were ready for blanching with soil. Owing to cool nights and dry conditions during the latter part of the summer, the yields obtained from all varieties were below the average and the stalks somewhat stringy. Golden Self-Blanching, Golden Plume, Paris Rose Ribbed, Giant Pascal and White Plume have always given satisfactory results for yield and quality at this Station.

CITRON

Two varieties of citron (Colorado and Red Seeded) were sown in the garden on May 25. Growth was retarded through cool nights and the early frosts of August completely destroyed the crop. In an average season the citron varieties mentioned above perform satisfactorily.

TABLE CORN

Fourteen varieties of corn were planted in hills 3 feet apart each way on May 23. The young plants emerged on June 2, but owing to cool weather made slow progress. Only home-grown seed reached maturity. The earliest varieties appear to be of best value here, owing to the short season. Pickaninny and Banting, recent introductions from the Central Experimental Farm, were ready for use on August 25. Late varieties such as Golden Bantam, Early Malcolm and Burleigh County were destroyed by early September frosts.

The test to determine the effect of removing suckers from corn was continued. Early Malcolm and Golden Bantam were used in this experiment. No difference in size of ears or earliness was gained by removal of suckers in 1928.

CUCUMBERS

Fifteen varieties of cucumbers were tested. The seed was sown in rows 4 feet apart on May 21. Germination was very uneven, so that the plants required no thinning. Cool weather throughout June retarded the growth and the plants were late in setting fruit. Frost on August 22 completely stopped further production. The Improved Long Green variety followed by Early Russian gave the best yields.

EGG PLANTS

Two varieties of egg plants were sown in the greenhouse on April 10 and transplanted to the garden on June 12. The plants made vigorous growth but none of them had fruit more than half-grown when destroyed by the frosts on August 22.

LETTUCE

Thirteen varieties of lettuce were sown in rows 15 inches apart on May 2 and again on June 20. In both instances the plants were thinned to 6 inches apart in the rows. The crop from both seedings thrived well and provided an abundant supply throughout the season. Varieties recommended are Iceberg, Hanson, New York and Crisp as Ice.

MUSKMELON

Four varieties of muskmelon were sown in the garden in rows 6 feet apart on May 26. Germination was decidedly uneven, so that the plants required no thinning. Growth was retarded in all varieties and the plants were late in setting fruit. Frost on August 23 completely destroyed the crop. This fruit does not produce a satisfactory crop at this Station.

ONIONS

Sixteen varieties of onions were sown in rows 15 inches apart on April 30, and thinned to 3 inches apart in the rows. The young plants were given three light sprayings of kerosene emulsion during the first week of growth to control onion maggot. All varieties were harvested September 12. The highest yielding varieties from a 30-foot row were Ailsa Craig, 32 pounds; Long Keeping, 28 pounds; Yellow Globe Danvers, 26 pounds; Giant Prizetaker, 25 pounds; and Red Wethersfield, 25 pounds.

PARSNIPS

In the test of varieties of parsnips Hollow Crown (C.E.F.) outyielded all other varieties. Elcombe Improved was second in yield. Owing to the late dry season all roots were below the average when harvested.

Six dates of seeding, at a ten-day interval, commencing May 3 were continued to June 25. Hollow Crown was the variety used. Seeding after June 5 produced an unprofitable crop.

PEAS

Seventeen varieties of peas were sown in 30-foot rows May 8. Fifteen feet of each row was used for green peas and the remaining portion allowed to ripen for seed. English Wonder (C.E.F.) and Thomas Laxton are excellent early varieties. Gradus and Western Beauty are dependable midseason varieties, while Stratagem is a late variety of good quality.

PEPPERS

Three varieties were sown in the greenhouse on April 4 and transplanted to the garden on June 14. Owing to cool nights, the plants made little growth. Frost on August 23 destroyed the crop.

PUMPKINS

Five varieties of pumpkins were under test. Seed was sown in hills 9 feet apart on May 22 and thinned to three plants to the hill. All varieties made splendid development, but their growing season was shortened by August frosts. Nevertheless, a medium crop was harvested on September 8. King of the Mammoth, Connecticut Field and Sugar are good varieties for our conditions.

POTATOES

Twenty-four varieties of potatoes were included in the variety test. The seed of these varieties was cut to average 2 ounces per set and the sets were spaced 12 inches apart in the rows, which were spaced 3 feet apart. The potatoes were planted on May 17 and were dug on September 26. All varieties were treated with formalin solution for common scab. The season was one of the most favourable for the growing of potatoes until August 23, when all foliage was practically destroyed. Except for common scab, very little disease was noted during the season.

POTATOES—TEST OF VARIETIES, 1928

Name of variety	Source of seed	Date of blooming	Date ready for use	Yield of marketable per acre	Yield of unmarketable per acre	Percentage small	Total yield per acre
				bush.	bush.	per cent	bush.
Gold Nugget	Scott	July 18	Aug. 14	362·7	141·1	28·0	503·8
Sutton Abundance	Lethbridge	" 17	" 17	350·6	141·1	28·7	491·7
Empire State	Scott	" 12	" 18	362·7	120·9	25·0	483·6
Prince Albany	Scott	" 13	" 17	378·8	100·8	22·9	479·6
Irish Cobbler	Rickett	" 13	July 30	318·4	120·9	27·5	439·3
Everitt	Scott	" 18	Aug. 16	302·3	120·9	28·6	423·2
Early Ohio	Scott	" 13	" 2	262·0	120·9	31·6	382·9
Early Ohio	Olds School	" 14	" 2	262·0	120·9	31·6	382·9
Dreer Standard	Scott	" 14	" 21	334·5	40·3	10·8	374·8
Carman No. 1	Scott	" 17	" 19	278·1	80·6	22·5	358·7
Irish Cobbler	Scott	" 14	" 12	290·2	60·4	17·2	350·6
Gold Coin	Scott	" 17	" 15	314·3	32·3	9·3	346·6
Bliss Triumph	Montana	" 12	" 14	322·4	20·2	5·9	342·6
Green Mountain	Scott	" 15	" 25	274·0	68·5	20·0	342·5
Morgan Seedling	Scott	" 15	" 18	298·2	40·3	11·9	338·5
Mitchell I.C		" 14	" 14	257·9	64·5	20·0	322·4
Wee MacGregor	Scott	" 15	" 20	270·0	40·3	13·0	310·3
Factor	Lethbridge	" 15	" 16	270·0	40·3	13·0	310·3
Bovee	Scott	" 12	" 17	282·1	24·2	7·9	306·3
Early Six Weeks	Scott	" 14	" 6	257·9	40·3	13·5	298·2
Utility	Stilwell	" 23	" 23	177·3	108·8	38·0	286·1
Burbank Russet	Hutton	" 18	" 25	221·6	48·4	17·9	270·0
Royal Russet	Lethbridge	" 17	" 16	213·6	24·2	10·2	237·8
Gold Coin G 9419		" 17	" 17	205·5	20·2	8·9	225·7

POTATOES—FOUR AND TWELVE-YEAR AVERAGES

Name of variety	Yield of marketable potatoes per acre	
	Four-year average	Twelve-year average
	bush.	bush.
Gold Coin	372·2	307·6
Carman No. 1	375·1	294·5
Prince Albany	377·1	293·5
Dreer Standard	380·0	290·6
Wee MacGregor	359·9	285·0
Empire State	367·0	283·9
Irish Cobbler	341·8	259·5
Everitt	296·5	244·8
Green Mountain	348·6	.....
Morgan Seedling	343·7	.....
Early Six Weeks	343·5	.....
Factor	338·8	.....
Sutton Abundance	333·7	.....
Gold Nugget	288·3	.....
Early Ohio	287·4	.....
Bovee	283·2	.....
Royal Russet	235·6	.....

SPROUTED VS. NON-SPROUTED

Name of variety	Date of blooming	Date ready for use	Yield of marketable per acre	Yield of unmarketable per acre	Percentage small	Total yield per acre
			bush.	bush.	per cent	bush.
Everitt—Sprouted	July 1	July 28	317·0	38·1	10·7	355·1
Everitt—Non-sprouted	" 14	Aug. 16	213·9	29·3	12·0	243·2
Gold Nugget—Sprouted	" 4	July 28	208·6	24·4	10·5	233·0
Gold Nugget—Non-sprouted	" 18	Aug. 14	192·0	20·8	9·8	212·8

RADISH

Of eight varieties of radish tested, Twenty-Day, French Breakfast and White Icicle proved the most satisfactory.

SALSIFY

Mammoth Sandwich Island was the only variety grown. This variety grew to a large size resembling a parsnip and possessed a delicate oyster flavour. From a row 30 feet long, 40 pounds of excellent roots were harvested.

SQUASH AND MARROW

Seven varieties of squash and marrow were sown in the garden on May 22. Three hills of each variety were planted 9 feet apart. Growth of all varieties was shortened by frost on August 22. Nevertheless a medium crop was harvested on September 8. English Vegetable Marrow and Hubbard Squash have done best here.

SWISS CHARD

Two varieties, Lucullus and Fordhook Giant, were sown on May 5 and ready for use on July 9. This vegetable is grown for greens and remains fit for use until late in the season.

TOMATOES

Forty-six varieties were started in the greenhouse on April 10 and transplanted to the garden on June 12. Due to the continued cool nights, the plants were checked and setting of the fruit delayed. Little fruit ripened outside in 1928. Bonny Best (Stokes) gave the highest yield of green tomatoes, 29 pounds from eight plants, with Alacrity (C.E.F.) producing 28 pounds.

TURNIPS

Four varieties of white turnips were grown. Good yields were obtained from all varieties; but owing to the dry weather during the latter part of the summer, all turnips were strongly flavoured.

SOWING VEGETABLES IN THE FALL

For the first time since 1923, fall sown seed of beets, cabbage, carrots, lettuce, onions, parsnips, spinach, radish and turnips were unsuccessful. The possible explanation may be the exceptionally warm weather occurring during the third week of March, followed by zero temperature around the middle of April. Such spring weather is most abnormal for this area.

TREE FRUITS

APPLES

Very little progress can be reported with the growing of apples, as a considerable number of trees throughout the plantations were winter-killed. Several of the hardier kinds which had been in bearing in previous years were severely injured, for reasons explained under the review of the season on first page of this report. Light crops of crabs were harvested from Osman, Prince and Elsa trees.

PLUMS

Only a few trees of the Manitoba native plums were seriously injured, the majority of these trees coming through the winter in excellent condition. Many of the trees were heavily laden with fruit and there were prospects of a bountiful plum crop until hail on July 4 removed a great portion of it. The cultivated varieties of Sapa and Opata plums, Rocky Mountain or Sand Cherry and Compass Cherry were severely winter-injured. An extremely light crop was harvested from these varieties.

SMALL FRUITS

CURRANTS

Bushes of the red and white currants were seriously injured by the severe frosts of April so that practically no fruit was produced. Black currants wintered well and the growth of the wood was strong and vigorous. All varieties were heavily laden with fruit until hail on July 4 removed a great proportion of it. Commercially available varieties such as Saunders, Climax and Kerry are satisfactory.

RASPBERRIES

An exceptionally heavy crop of raspberries was harvested. The raspberry canes were protected during the winter by bending down and covering with strawy litter. Raspberries were picked from July 24 to August 28 with a few berries of all varieties picked till September 5. The Herbert variety was outstanding and from a row 30 feet long, 40 pounds of excellent fruit were picked. Brighton and Count followed with 26 pounds and 22 pounds respectively.

STRAWBERRIES

All varieties of strawberries came through the winter in good condition. A medium crop of fruit was picked from all varieties. The Dakota and Senator Dunlap gave the best returns and appear quite hardy.

TREES AND SHRUBS

Because of the large number of written and oral inquiries concerning trees and shrubs suitable for northwestern Saskatchewan, a short list of recommended varieties is given herewith:—

CONIFERS.—*Picea pungens Kosteriana* (Blue Spruce), *Pinus sylvestris* (Scotch Pine), *Pinus Banksiana* (Jack Pine), *Pinus contorta Murrayana* (Lodge Pole Pine), *Picea canadensis* (White Spruce) and *Abies balsamea* (Balsam Fir). Other species of conifers are under trial at this Station but those recommended have proven quite hardy.

DECIDUOUS TREES.—*Populus petrowskyana* (Russian Poplar), *Ulmus americana* (American Elm), *Fraxinus lanceolata* (Green Ash), *Acer Negundo* (Manitoba Maple), *Acer ginnala* (Amur Maple), and *Acer tataricum adjuense* (Tartarian Maple). The two latter although usually resembling a shrub more than a tree are quite attractive throughout the summer, as the relatively small leaves and rosy seeds, while developing, add to their ornamental value. Several species of willow are hardy but the laurel-leaf willow is very ornamental and easy to obtain.

SHRUBS.—*Pyrus Aucuparia* (European Mountain Ash), *Syringa chinensis, Syringa villosa, Lonicera tatarica* (Tartarian honeysuckle), *Viburnum Opulus* and *Syringa vulgaris.* Caragana (several species). Among Spiraeas, Van Houttei has both hardiness and beauty.

PERENNIAL FLOWERS

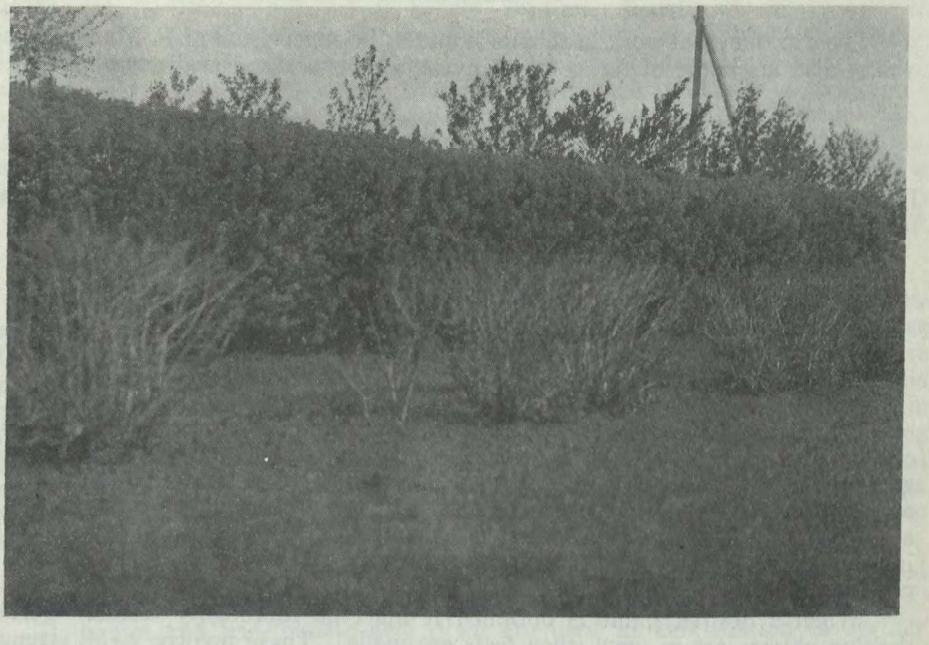
The perennials made an excellent showing in 1928. Only traces of winter injury were observed. Growth was good owing to the frequent rains early in the season, and bloom was continuous from early spring until late fall. Considerable damage was done by hail on July 4 especially to the taller varieties, but these recovered and bloomed profusely.

ANNUAL FLOWERS

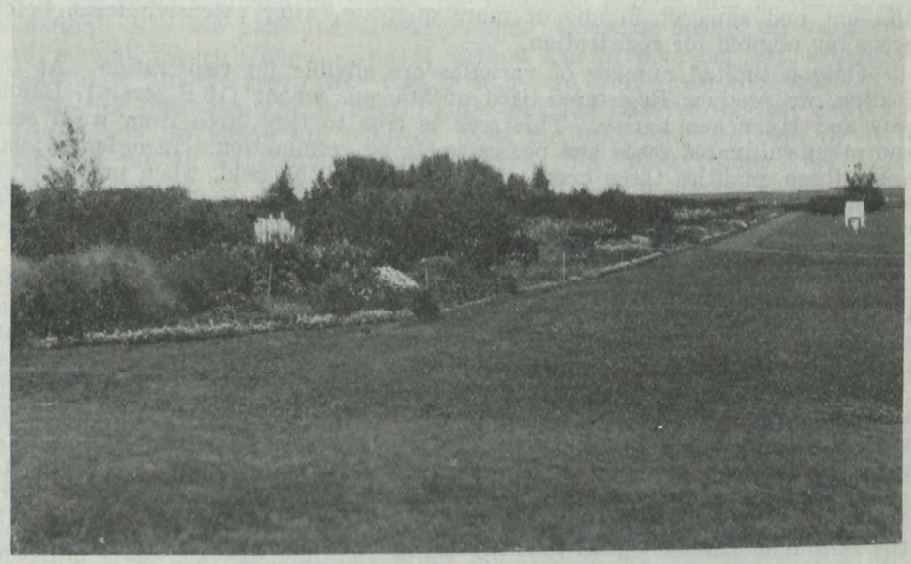
The annual flowers again filled their place in furnishing the grounds with brightness from June 15 to September 15. One hundred and fifty varieties were grown. Practically all were sown outside, but the more tender varieties were sown in the greenhouse and transplanted to the flower border early in June. The hail storm on July 4 completely destroyed several tender varieties. The combination of annuals and perennials in the flower border was the largest and best in the history of this Station.

BULBS

Tulips are one of the easiest plants to grow and make an excellent display of bloom, when very few flowers are available from early May till the middle of June. Mid-October is usually the time when bulbs are set at this Station. The bulbs are planted 4 to 6 inches deep and 6 inches apart. Just before freeze-up, they are covered with 6 inches of strawy manure which is removed in the early spring. Recommended varieties of tulips are White Swan (pure white), Le Matador (bright scarlet) and Prosperity (deep pink). Darwin tulips: Painted Lady (cream white), La Notre (clear pink) and William Copland (light lilac).



Common Caranga hedge in background, *Spiræa opulifolia* in foreground. Note difference in hardiness under prairie conditions.



Perennial flower border, Scott, 1928.

CEREALS

The experimental work in cereals is under the supervision of F. M. MacIsaac, who is also in charge of forage crop investigations and cultural experiments.

CEREAL INVESTIGATIONS IN PROGRESS

Cereal policies at this Station are an extension of those of the Cereal Division of the Central Experimental Farm, Ottawa. Our major activities may be grouped into five main headings:—

1. Production of superior varieties.
2. Testing of varieties and strains.
3. Production of Registered Seed.
4. Co-operative work.
5. Varietal zonation.

No variety is perfect. Selections within standard varieties of grain are continually in progress. This work is commenced in the field during the growing season. Selection is often done to improve a desired character, to overcome a weakness, to hasten maturity or, perhaps, to increase resistance to a disease. It is not always possible to achieve these objectives by selection, in which case crossing or hybridization must be resorted to in any attempt to combine the desired qualities.

When a desired plant is obtained it must be thoroughly tested. Certain definite objects are in view when tests are made. These involve yield, strength of straw, non-shattering ability and attitude toward disease. In addition, certain requirements are given consideration for the particular class of grain, such as milling and baking for wheat, malting for barley and percentage hull for oats. Many crosses or selections are discarded in the initial stages, because they fall down on one of these vital requirements. New varieties must be different and superior in one or more qualities, after extensive tests, before becoming eligible for registration.

Only a limited number of varieties are eligible for registration. At this Station, we produce Registered Seed of Marquis wheat (10 B strain), Banner oats and Hannchen barley. This seed is true to type, free from weed seeds and other cultivated seeds and possesses strong germination. In order to guarantee these qualities these crops are inspected in the field, when prepared for sale and sealed in bags by an inspector of the Dominion Seed Branch. In this way reliable seed stocks are made available to the public, and thus this Station co-operates in the improvement of cereal crops.

Our co-operation in cereal work extends into other fields. Selections made by farmers, to the extent of over twenty, are being tested this year in comparison with standard varieties. Small plots, from fields of registered seed produced by farmers, are sown in co-operation with the Canadian Seed Growers' Association, and field days are held when the growers examine these plots under the guidance of specialists trained in this work. Co-operative work is done with the University of Saskatchewan in the study of bio-chemical variations in wheat grown in different areas. Almost 500 plots are used in studying the control of important cereal diseases such as rust, smut and root-rot in co-operation with the Dominion Division of Botany. Farmers are co-operating with the Dominion Entomological Branch, through this Station, to lessen the damage caused by wireworms in cereal crops. A co-operative experiment studying the effect of superphosphate for wheat is in progress. No effort is spared to fully co-operate with all agencies working for the improvement of cereal crops.

A further extension of our cereal work is found in variety tests conducted by farmers in the territory served by this Station. Results of variety tests at this Station are not an accurate guide for varying soil and climatic conditions existing in northwestern Saskatchewan. So far, these tests have been mainly with varieties of common spring wheats; but we are gradually working into oats and barley varieties. Forty-nine farmers received seed for tests of varieties under the direction of this Station in 1928. This is part of a general plan, initiated by the Cereal Division in 1924, to zone the Prairie Provinces for grain varieties.

METHODS EMPLOYED IN CEREAL INVESTIGATIONS

The production of superior varieties is accomplished by selection and crossing. Superior heads are selected from plots and fields at this Station, from fields in the district and, in some cases, are sent in by farmers. Crosses are made at the Central Experimental Farm, Ottawa, and supplied to this Station for study and development. Seed from individual heads is sown separately in head rows and special attention is given to the progeny. Minute and exacting methods are employed to make sure that the desired qualities are incorporated in the material being studied. It often takes several years before plants can be obtained which will reproduce true to type and be sufficiently increased to permit further testing.

Up to this time the material has been studied for purity and desired field characters, but no consideration has been given to yield.

Rod-rows and one-fortieth-acre plots are used at this Station in further studies, and in making tests for yield. Rod-row plots are seeded 18½ feet long but one foot is removed from each end at harvest time. Five rows constitute a plot which is replicated four or eight times, depending on its importance. The rows are 7 inches apart and seeded in a solid block with two guard rows sown at the ends of blocks. All varieties are sown with the same number of germinable seeds per acre calculated on weight per thousand kernels and percentage germination. Rod-row plots are seeded by hand. Rows are opened up and covered with a small garden plough. By this method four persons can seed a thousand rows a day. In the case of the one-fortieth-acre plots these are seeded with a double-disk sixteen-run grain drill. Three plots of each variety are sown. At harvest time, 15 inches are removed from the ends and two rows from the sides are cut off to eliminate border effect. The rows to be removed are separated by a small triangular machine and cut by a binder. This leaves a plot which compares favourably with field conditions.

A variety which has demonstrated its superiority and is eligible for registration is used to produce Registered Seed. From a field of registered grain over 500 heads true to type are selected and sown in head-rows the following year. The progeny is studied for purity and all heads showing off-types are discarded. Of the remainder, all but a few specially selected are bulked together to provide seed for an elite stock plot, which is sown the following year in rows so that it can be readily inspected. The specially selected plots are carried forward in individual plots to form a basis for Elite Stock Seed, so that the product originates from a single head. This process is continually going forward. Starting in 1929 our elite stock blocks will be traceable to a single head. Successive generations of this seed are multiplied and sold in limited quantities to farmers. This provides a basis for improving the general quality of grain crops and the resulting crops are eligible for registration, thus providing bulk lots of Registered Seed for the commercial trade.

When farmers supply selections they have made, tests are conducted in the manner described above and a report is furnished the sender.

Co-operative work with farmers in testing their Registered Seed is done through the Canadian Seed Growers' Association; but this test is only for purity.

Co-work in cereal diseases is handled somewhat differently. For rust, seed of different varieties and strains is supplied to study their resistance. For smut, infected seed treated in different ways with various substances is supplied to study the effect of treatments used. Both are sown in rod-row plots. A representative from the Dominion Rust Laboratory examines these plots for disease when the crop is ready to take the necessary notes. For root-rot, rotations involving different methods and all containing wheat, ranging from two to six year's duration, are conducted by this Station in one-hundredth-acre plots, and a representative from the Division of Botany examines all wheat plots. In the study of bio-chemical variations in wheat, seed is supplied to this Station and plots are handled in the usual way, but samples of soil and grain are supplied to the Chemistry Department of the University of Saskatchewan. In wireworm infested areas farmers under our supervision, are conducting certain treatments such as cross-packing, press-drill, seed treatment and rotations; but a representative from the Dominion Entomological Laboratory at Saskatoon makes observations and takes counts on wireworm population where necessary. The method used for the co-operative experiment for superphosphate on wheat was to apply the material at time of seeding with a combination fertilizer drill. A one hundred and twenty-five pound rate and another of twenty-five pounds were used in plots of five acres each on summer-fallow and spring-ploughed stubble with check plots of equal size. Fertilizer and drill were supplied by the Canadian Pacific Railway. Results of this experiment are given in the table on page 30.

The plan of procedure followed in conducting local variety tests with farmers has been arranged to make the work as simple as possible, and yet one which will supply the required information. This plan is outlined in detail in a circular, which may be obtained free upon application to this Station. If the farmer is willing to comply with the instructions in this circular, seed of a number of the most promising varieties is forwarded in time for seeding. A form is also sent with the seed, upon which the farmer records his observations and gives his opinion as to the suitability of the different varieties for his particular district. A member of the Experimental Station staff visits each co-operator during the growing season. With close and careful co-operation between the Experimental Farms and co-operators it should be possible, in the near future, to divide the grain-growing sections into zones where certain varieties may be safely recommended.

SPRING WHEAT

Except for frost, which occurred in the fourth week of August, the season was ideal for the spring wheat test of seventeen varieties. Seeding was done on summer-fallow at a rate of 1½ bushels per acre, except durums (Kubanka, Mindum and Pelissier) which were seeded at 1¾ bushels. Marquillo was not seeded with other varieties on May 3 but sown seven days later which should be considered in studying the results shown in the following table. Tests were conducted in one-fortieth-acre plots sown in triplicate.

WHEAT—TEST OF VARIETIES OR STRAINS, 1928

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on a scale of 10 points	Yield of grain per acre	Comparative yields (Marquis Ottawa 15 = 100)	Weight per measured bushel after cleaning
			in.		bush.	per cent	lb.
Early Triumph	Aug. 20	109	47·3	9·2	39·2	108·3	63·0
Early Red Fife, Ott. 16	" 29	118	48·3	8·5	32·3	89·2	63·5
Garnet, Ott. 652	" 15	104	45·0	7·5	42·8	118·2	64·0
Kitchener	" 29	118	48·7	8·1	34·0	93·9	64·0
Kubanka, Sask. 6	Sept. 3	123	50·0	2·5	35·0	96·7	63·0
Marquis, Ott. 15	Aug. 26	115	44·7	8·0	36·2	100·0	64·0
Marquis 10B	" 26	115	44·7	8·0	37·6	103·9	64·0
Marquillo	Sept. 2	115	42·0	7·7	36·0	99·4	61·0
Mindum	" 2	122	52·0	4·3	38·1	105·2	64·0
Pelissier	" 2	122	50·0	4·3	40·4	111·6	63·0
Red Bobs (Wyler)	Aug. 22	111	45·7	9·8	41·3	114·1	63·0
Red Bobs 222	" 22	111	45·3	9·7	38·1	105·2	63·5
Red Fife, Ott. 17	Sept. 1	121	48·3	8·7	33·1	91·4	63·0
Reliance	Aug. 26	115	44·3	7·0	39·1	108·0	66·0
Renfrew	" 31	120	49·7	9·5	39·2	108·3	63·0
Reward, Ott. 928	" 18	107	45·0	9·2	43·3	119·6	66·0
Supreme	" 23	112	44·0	9·9	43·0	118·8	62·0

In order to give the reader a more comprehensive idea of the performance of wheat varieties at this Station, a five-year average of ten varieties is given in the following table, followed by additional notes on each variety listed.

WHEAT—FIVE-YEAR AVERAGE, 1924-1928

Name of variety	Number of days maturing	Average length of straw including head	Strength of straw on a scale of 10 points	Yield of grain per acre	Comparative yields (Marquis Ottawa 15 = 100)	Weight per measured bushel after cleaning
		in.		bush.	per cent	lb.
Early Triumph	113·2	33·9	9·8	32·9	107·5	62·3
Garnet, Ott. 652	107·8	32·9	9·1	32·4	105·9	62·5
Kitchener	121·8	36·0	9·4	28·9	94·4	62·6
Kubanka, Sask. 6	127·2	40·2	6·8	28·0	91·5	62·8
Marquis, Ott. 15	118·6	34·8	9·5	30·6	100·0	62·8
Marquis 10B	118·6	34·2	9·5	29·7	97·1	62·8
Red Bobs (Wyler)	114·2	33·5	9·9	33·5	109·5	62·0
Red Fife, Ott. 17	124·6	35·5	9·2	27·5	89·9	62·0
Reward, Ott. 928	110·0	34·3	9·7	31·0	101·3	64·0
Supreme	115·6	32·9	10·0	31·0	101·3	62·2

Early Triumph is a selection made by Dr. Seager Wheeler out of Red Bobs. The head is free from awns and stands erect, thus providing an attractive field appearance. At this Station ,it matures five days earlier than Marquis. Straw is of a desirable length and possesses good strength. In seasons when rust is prevalent this variety shows high susceptibility. For yield it occupies a leading place in tests at this Station; but is slightly below the average in weight per bushel for varieties shown in table No. 4. While not considered inferior for colour, the bran is noticeably lighter than that of dark red kerneled varieties and it lacks the lustre of a good show wheat. Tests show that the variety has good milling and baking value. In general, this variety compares favourably with Marquis. For adaptability, Early Triumph is giving a good account of itself in northern prairie areas, but in the bush country it has a strong tendency to be piebald.

Garnet is the product of a cross, between Preston A and Riga M, made at Ottawa in 1905. Twenty years later it was introduced to the public. Heads taper at both ends and carry a few short awns at the tip. At this Station, it matures eleven days earlier than Marquis. In wet years, on summer-fallow land particularly, it exhibits a tendency toward weakness in straw. While this variety does not show resistance to rust its earliness is a factor in escaping this disease. Yield is a strong feature of this early variety. Weight per measured bushel is about average. Kernels are bright red in colour, but certain growers are not attracted by the elongated shape of the grain. Although the flour has a creamy yellow colour, it possesses good baking strength. (See Bulletin No. 83—New Series—"Garnet Wheat", by L. H. Newman and A. G. O. Whiteside). The acreage of this variety is rapidly increasing in the northern portion of the Prairies because of its earliness, high yield and comparative freedom from piebald kernels in bush country.

Kitchener is a selection made from Marquis in 1911 by Dr. Seager Wheeler. Heads have their width carried well up to the tip, and in some years when there is a plentiful supply of moisture, the width of the tip is pronounced. Short awns are carried on the upper part of the head. It usually has more rust than Marquis when this disease is prevalent. Good length and strength of straw are shown by this variety. For yield, it occupies a comparatively low place in tests at this Station. Kernels are of good size with an average weight per measured bushel. The colour of the grain is not inferior to Marquis. Baking strength is good but colour of crumb is only fair. Generally speaking the popularity of this variety is waning among growers.

Kubanka belongs to the amber durum class of spring wheats. Although of Russian origin it came to this country from the United States. Heads are bearded, with chaff of a slightly reddish tinge, and are inclined to hang over as maturity advances. Straw is long and weak. Rust is not usually a serious factor with this variety, although, like other durum wheats, it is late in ripening. Kernels are large, amber in colour and above average in weight per bushel. This is not a breadmaking wheat. Because of its low yield and other undesirable qualities, this variety cannot be recommended for northwestern Saskatchewan.

Marquis is a product of the Dominion Experimental Farms resulting from a cross made in 1892 between Hard Red Calcutta and Red Fife. The two strains shown in table No. 4 may be considered together, as we find no essential differences in type of performance. Heads taper from the middle toward tip and base. At the present time it is considered medium for maturity. The straw is strong and of a good average length. Among the common spring wheats it ranks well for disease resistance. Few varieties excel it in yield. Its kernels are attractive and have a high weight per bushel. For milling and baking it is used as a standard. This variety has a wide adaptation over the Prairie Provinces, but is decreasing in popularity where rust and frost are serious menaces to wheat production.*

Red Bobs (Wyler) is a selection of this variety made by R. O. Wyler of Luseland, Sask. This selection is apparently identical with Early Triumph except that it matures about a day later.

Red Fife, Ottawa 17, is a "pure line" selection made from the original variety in 1903. Except for a few short awns at tip the heads are essentially beardless. Practically a week more than Marquis requires is necessary to mature this variety. Straw is considered long and shows tendency to weakness on summer-fallow in wet years and when rust is prevalent. It usually receives more rust than does Marquis. The above table shows it to be comparatively low

* For further information see Pamphlet No. "Marquis Wheat," a description of the standard type by Newman and Fraser, Publications Branch, Department of Agriculture, Ottawa.

in yield; but the figures do not reveal that the kernels are of good colour and that the heads shatter readily. Although Red Fife has good milling and baking qualities, the area sown to this late maturing variety has been reduced to a comparatively small acreage.

Reward, Ottawa 928, is the result of a cross made in 1912 between Marquis and Prelude. Heads are practically beardless and somewhat ragged in appearance. The rudimentary awns become dark at the base as the heads mature. Hairy chaff is a distinguishing feature of this variety. Erect straw of medium length is produced. For rust it possesses a higher degree of resistance than other spring wheats commonly grown. In wet years, glume diseases may be present but not to a harmful degree. Large dark red kernels of high weight per bushel are a characteristic of this variety. Its milling and baking qualities are excellent.* In yield tests at this Station it compares favourably with Marquis; but its general adaptation to prairie conditions has yet to be decided.

Supreme is a selection made by the originator of Red Bobs out of that variety. In shape of head it differs from its sister sort, Early Triumph, in that it tapers more toward the tip; but shows no distinct difference in length and strength of straw. It is more susceptible to stem rust than other selections from Red Bobs. Marquis has not excelled it in yield at this Station. Milling and baking qualities of this variety are usually good.*

OATS

Forty-three one-fortieth-acre plots were used to test fifteen varieties of oats in 1928. These were seeded on summer-fallow land May 5 at a rate of 2¼ bushels per acre for all except hulless varieties which were seeded at the rate of 1¼ bushels. Perfect stands were secured and rainfall distribution produced heavy growth. Under such conditions, when strong wind and rain came together on the afternoon of July 24, the late maturing varieties with their heavy straw went down and never fully recovered. This fact should be considered in studying the strength of straw shown in the next table.

In order to give the reader a more intelligent idea of the performance of oat varieties, average results covering a test for four years are presented in another table.

OATS—TEST OF VARIETIES OR STRAINS, 1928

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on a scale of 10 points	Yield of grain per acre	Comparative yields (Banner Ottawa 49 =100)	Weight per measured bushel after cleaning
			in.		bush.	per cent	lb.
Abundance	Aug. 21	108	49·7	6·0	80·1	93·7	41·0
Alaska	" 8	95	44·3	9·0	77·1	90·2	40·0
Banner, Ott. 49	" 23	111	49·3	6·0	85·5	100·0	40·0
Banner, Sask. 144	" 24	112	48·7	5·3	78·0	91·2	38·0
Cole, Sask. 795	" 8	95	41·7	7·0	84·8	99·2	37·5
Gerlach, Sask	" 22	110	48·0	5·3	82·0	95·9	37·0
Gopher	" 12	99	46·0	8·8	90·1	105·4	42·0
†Irish Victor P	" 20	108	45·0	7·0	87·3	102·1	40·0
Laurel, Ott. 477	" 17	104	48·7	10·0	79·2	92·6	54·0
Leader	" 23	111	46·3	4·0	78·2	91·5	32·0
Legacy, Ott. 678	" 16	103	45·0	8·0	96·2	112·5	36·0
Liberty, Ott. 480	" 16	103	49·3	10·0	66·4	77·7	51·0
Longfellow, Ott. 478	" 20	107	51·3	7·0	82·7	96·7	40·0
O.A.C. No. 3	" 9	96	42·3	9·5	81·5	95·3	40·0
Victory	" 26	114	46·7	6·2	83·6	97·8	40·0

†One plot only.

*According to reports received from the Cereal Division at Ottawa, on samples submitted.

OATS—FOUR-YEAR AVERAGE, 1925-1928

Name of variety	Number of days maturing	Average length of straw including head	Strength of straw on a scale of 10 points	Yield of grain per acre	Comparative yields (Banner Ottawa 49 =100)	Weight per measured bushel after cleaning
		in.		bush.	per cent	lb.
Alaska	92·8	38·1	9·2	71·7	86·8	38·6
Banner, Ott. 49	105·5	41·3	8·5	82·6	100·0	38·0
Banner, Sask. 144	106·3	41·4	8·3	83·2	100·7	37·1
Cole, Sask. 795	91·5	35·6	8·5	73·5	89·0	34·7
Gerlach, Sask	106·8	40·8	8·3	80·9	97·9	38·0
Laurel, Ott. 477	101·0	39·9	9·8	65·5	79·3	51·8
Leader	106·8	40·5	7·9	79·8	96·6	35·0
Legacy, Ott. 678	99·5	38·1	9·1	86·4	104·6	37·6
Liberty, Ott. 480	100·0	42·3	9·5	55·1	66·7	49·9
Longfellow, Ott. 478	102·3	42·3	8·3	73·5	89·0	38·5
O.A.C. No. 3	93·8	37·6	9·5	73·1	88·5	37·4
Victory	107·5	40·6	8·6	81·4	98·5	39·9

Early oats are represented by three varieties—Alaska, Cole and O.A.C. No. 3. These have comparatively fine, short straw of good strength. The kernels are small but have the advantage of a thin hull. Generally speaking, the yields are low and there is no particular advantage in growing this class of oats for feed purposes in northwestern Saskatchewan.

Hulless oats are represented by Laurel and Liberty. Both have straw of good length and strength. Their field appearance is somewhat attractive. They appear to be more susceptible to smut than hulled varieties and copper carbonate should be substituted for formalin in treating them for this disease. Considering the absence of hull, their yield ranks favourably with the hulled varieties of oats, but Laurel is better in this respect than Liberty. Hulless sorts are not grown to any extent except as a special feed for poultry and young stock.

Medium maturing oats are represented by Longfellow and Legacy. The former has no particular advantage for green feed or grain. While there is considerable demand for a high-yielding oat which matures somewhat earlier than late standard varieties, none has yet combined these factors to the satisfaction of growers; but Legacy gives promise in this respect.

Late maturing oats are represented by Leader, Gerlach Sask., Banner and Victory. Leader is a side-oat with rather coarse straw which is not so strong as that of the other varieties. Gerlach has done well but has no outstanding qualities to recommend it over Banner which, for yield and general performance, is the most popular sort in the Prairie Provinces. Victory is about equal to Banner in point of yield, but is used more as an exhibition oat because of its more attractive appearance and usually higher weight per bushel. Among oat varieties commercially available, a farmer is making no mistake in growing Banner or Victory.

BARLEY

Fifteen varieties of barley were tested in one-fortieth-acre plots on summerfallow in 1928. The date of seeding was on May 10 and the rate 2 bushels per acre, except hulless varieties which were seeded at the rate of 1¾ bushels. All plots were sown in triplicate. A combination of wind and rain served to exaggerate the weakness of straw in certain varieties, as shown in table No. 7. There is reason to believe that the same cause decreasd yield and prevented proper filling, as shown by weight per bushel in 1928.

Barley is not grown extensively as a market crop in this area, but the acreage is increasing. An increasing number of inquiries concerning barley is noticeable. Results presented in the following table will be helpful in choosing the barley to grow.

BARLEY—TEST OF VARIETIES OR STRAINS, 1928

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on a scale of 10 points	Yield of grain per acre	Comparative yields (O.A.C. 21 =100)	Weight per measured bushel after cleaning
			in.		bush.	per cent	lb.
Barks Excelsior	Aug. 27	109	40·7	4·0	40·7	85·3	45·5
Bearer, Ott. 475	" 21	103	46·7	2·0	39·4	82·6	47·0
Canadian Thorpe	" 22	104	48·0	5·0	42·1	88·3	50·0
Chinese, Ott. 60	" 16	98	46·0	7·3	50·9	106·7	48·0
Colsess	" 11	93	41·0	9·3	53·6	112·4	44·5
Duckbill, Ott. 57	" 22	104	47·3	9·3	42·1	88·3	49·5
Feeder, Ott. 561	" 12	94	47·3	9·2	30·5	63·9	48·0
Gold	" 20	102	40·0	5·2	58·6	122·9	53·0
Hannchen, Sask. 229	" 20	102	41·3	6·0	59·3	124·3	53·0
Himalayan, Ott. 59	" 13	95	36·0	8·0	46·5	97·5	64·0
Junior, Ott. 471	" 9	91	35·3	8·0	40·7	85·3	64·0
O.A.C. 21	" 16	98	46·3	7·0	47·7	100·0	48·5
Star	" 11	93	33·7	9·0	45·0	94·3	49·0
Swedish Chevalier	" 23	105	41·0	2·0	38·2	80·1	46·0
Trebi	" 16	98	38·0	7·7	67·0	140·5	49·0

BARLEY—FOUR-YEAR AVERAGE, 1925-1928

Name of variety	Number of days maturing	Average length of straw including head	Strength of straw on a scale of 10 points	Yield of grain per acre	Comparative yields (O.A.C. 21 =100)	Weight per measured bushel after cleaning
		in.		bush.	per cent	lb.
Barks Excelsior	103·8	32·8	7·1	46·0	94·1	46·8
Bearer, Ott. 475	102·8	37·9	6·6	44·7	91·4	47·6
Chinese, Ott. 60	96·8	38·9	8·1	50·4	103·1	49·0
Duckbill, Ott. 57	104·3	35·9	9·7	42·8	87·5	51·3
Feeder, Ott. 561	90·3	38·7	9·1	38·2	78·1	48·9
Hannchen	100·0	33·9	7·4	54·8	112·1	53·0
Himalayan, Ott. 59	91·3	30·3	9·0	48·2	98·6	62·7
Junior, Ott. 471	88·5	30·2	9·0	43·0	87·9	62·4
O.A.C. 21	96·8	39·4	7·5	48·9	100·0	48·8
Swedish Chevalier	104·0	33·2	6·1	41·9	85·7	49·0
Trebi	96·3	31·7	8·4	61·8	126·4	48·5

Feeder belongs to the six-rowed hooded type. Heads are brittle and shatter readily. Yield of grain is low. It has little to recommend it for grain production. Owing to its earliness, with leafy straw of good length, it possesses merits as an annual hay.

Junior and Himalayan are six-rowed bearded types which thresh out free from hull. Kernels of the former are yellowish and the latter greenish. Both are early short-strawed varieties. Himalayan has given higher yields. Hulless barleys are not extensively grown, although they are popular among certain live stock producers for feeding purposes.

Of the two-rowed varieties represented Duckbill has erect heads, those of Hannchen are inclined, while the heads of Swedish Chevalier may be described

as nodding. Generally speaking, the two-rowed sorts do not shatter as much as the six-rowed sorts. In addition, the separation of awns when threshed is much more complete for two-rowed sorts. All two-rowed varieties mentioned in the above table partly shed their awns before harvesting. Swedish Chevalier ripens rather late and has weak straw of medium length. Duckbill also ripens late but has strong straw of fair length. Hannchen ripens medium early, but its straw has a tendency to be weak especially when grown on summer-fallow land. At this Station, Swedish Chevalier and Duckbill are comparatively low in yield; but Hannchen has done well in this respect.

Results from five six-rowed barleys are shown in table No. 8. Barks Excelsior and Bearer are similar in time of maturity, strength of straw and yield; but the former has a more compact head and shorter straw. Chinese and O.A.C. 21, while medium for maturity and yield, differ from the others in that the kernels are bluish beneath the hull and excel for malting, with the latter preferred for this purpose. Trebi is medium early with short straw of good strength, it gives a high yield of feed barley, but is not recommended at present for malting purposes.

FIELD PEAS

Results from test of varieties of field peas for 1928 are given in table No. 9. These were sown on May 16 in triplicate one-fortieth-acre plots. Summer-fallow land was used. Owing to the very dry weather during the latter part of May, the varieties did not germinate as well as in previous years, with the result that there were more weeds than usual, especially pigweed. The seed was sown at the rate of 1½ to 3 bushels per acre, depending on the size of the seed.

FIELD PEAS—TEST OF VARIETIES OR STRAINS, 1928

Name of variety	Date of ripening	Number of days maturing	Average length of vine	Average length of pod	Yield of grain per acre	
					1928	Four-year average
			in.	in.	bush.	bush.
Arthur, Ott. 18	Sept. 6	113	49·3	2·2	24·2	32·9
Cartier, Ott. 19	" 6	113	50·7	2·3	26·4	33·2
Chancellor, Ott. 26	" 2	109	49·3	1·8	30·1	36·1
Dashaway, Sask. 625	" 2	109	50·7	1·9	30·0	36·1
Mackay, Ott. 25	" 8	115	52·0	2·5	25·6	36·5

Arthur and Cartier are both medium in size and maturity. Both bear flowers at tip, but the stem of Arthur is coarser and more triangular in shape. Chancellor and Dashaway are small, early maturing peas which bear their flowers at axils of the stem. They are identical in size, field performance and yield. Mackay is a large black-eyed, late-maturing variety which gives a slightly higher yield of grain and forage than the other varieties. Although comparatively poor weed-fighters, peas have a special use in improving the protein content of live stock rations. To avoid splitting, peas should not be threshed in bright clear weather.

FLAX

Four varieties of flax were tested this season. These were sown on May 19 and produced fairly good stands. Yields appear somewhat high, due to being tested on clean summer-fallowed land.

FLAX—TEST OF VARIETIES, 1928

Name of variety	Date of ripening	Number of days maturing	Average length of straw	Strength of straw on a scale of 10 points	Yield of grain per acre	
					1928	Seven-year average
			in.		bush.	bush.
Crown, Sask.	Sept. 8	112	24	9·5	19·8	12·4
Linota	" 7	111	24	9·5	19·5	.....
Novelty, Ott. 53	" 12	116	23	9·5	17·8	11·8
Premost	" 5	109	25	9·5	19·4	12·5

Generally speaking, there is no significant difference in yield between these varieties. Premost is the earliest and Novelty is somewhat late. Their order for resistance to wilt disease is Linota, Premost, Novelty and Crown. Based on the seven-year average, our recommendation is Premost; but this area cannot be considered adapted for flaxseed production.

RYE VERSUS EMMER FOR FEED

Tests for spring rye and emmer have been made for seven years, to determine their relative value for yield of feed. The results shown in the following table indicate a decided superiority of spring rye for this purpose, and this project is now concluded.

YIELD PER ACRE OF SPRING RYE AND EMMER

Name of variety	1922	1923	1924	1925	1926	1927	1928	Seven-year average
	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.
Prolific spring rye	20·5	53·2	19·9	39·0	30·6	52·6	41·8	36·8
Early Emmer, Ott. 44	17·1	35·7	5·7	31·7	17·6	45·2	32·7	26·5

DISEASES

The following list gives the cereal diseases observed on the Experimental Station in 1928. The degree of infection was slight, except in the case of flax wilt and crown rust of oats which were moderate.

WHEAT:—

Stem rust—*Puccinia graminis tritici.*
Leaf rust—*Puccinia triticina.*
Bunt—*Tilletia tritici.*
Loose smut—*Ustilago tritici.*
Take-all—*Ophiobolus graminis.*
Basal glume rot—*Bacterium atrofaciens.*
Glume blotch—*Septoria nodorum.*
Ergot—*Claviceps purpurea.*
Root-rot—Helminthosporium sativum.

OATS:—
Loose smut—*Ustilago avenæ.*
Covered smut—*Ustilago levis.*
Crown rust—*Puccinia coronata.*
Stem rust—*Puccinia graminis avenæ.*
Halo leaf-blight—*Bacterium coronafaciens.*
Leaf spot—*Helminthosporium avenæ.*

BARLEY:—
Stripe—*Helminthosporium gramineum.*
Net blotch—*Helminthosporium teres.*
Stem rust—*Puccinia graminis.*

RYE:—
Ergot—*Claviceps purpurea.*

PEAS:—
Bacterial blight—*Bacterium pisi.*
Ascochyta blight—*Ascochyta pisi.*

FLAX:—
Wilt—*Fusarium lini.*

FORAGE CROPS

The crop season of 1928 was only moderately favourable for the production of forage crops. The high winds, together with a precipitation of 0·57 inch below the average for the month of May, resulted in comparatively low yields of grass crops, but sweet clover did not suffer to the same extent in this respect. The yields of other forage crops tested were fairly good, with the exception of corn. The short season and varying climatic conditions from year to year limit the number of forage crops that can be grown in this district.

The major projects conducted under this heading consist chiefly in testing for hardiness, yield, drought resistance and purity of type. The object of the work is to discover varieties of forage crops that can be grown successfully under northwestern Saskatchewan conditions.

On account of the various kinds of forage crops differing so widely in percentage of moisture when cut for hay, it is apparent that a constant basis for comparison is necessary. The percentage of absolute dry matter is used for this purpose. Samples are taken from all plots at the time of cutting, and oven dried to a moisture-free condition. From the percentages of dry matter, the dry matter and cured hay yields are calculated. In order to give the reader a more intelligent idea of the relative merits of the different varieties, the dry matter yields are included for the various crops.

The majority of the plots used for this work are long and narrow. Their width is eight feet, a strip sown by a sixteen-run drill. The length of the plots is so designed that after removing the end borders, a 6-foot mower driven through the centre of the plots cuts an area of one-hundredth of an acre. This method has given good results for eliminating border effect, which is usually pronounced under conditions that prevail at this Station.

The work under forage crops is discussed under three headings, intertilled crops, annual hay crops and biennial and perennial hay crops.

INTERTILLED CROPS

CORN

Twenty varieties of corn were seeded on summer-fallow land during the last week in May. The seed was sown with a corn planter in rows 3 feet apart and the young plants thinned to 12 inches apart in the rows. The germination in the Dent varieties was higher than in the Flints. The good distribution

of moisture and comparatively warm weather during the growing season did not produce as rapid a growth as might be expected. Frosts occurred for three successive nights, August 23, 24 and 25, damaging the corn to such an extent that it was not worth cutting. This is the second time in the last three years that corn has been a failure at this Station, due to frost. The results of tests to date indicate that corn is not a dependable ensilage crop for this district, and only relatively low yields are produced in the most favourable seasons.

SUNFLOWERS

Five varieties of sunflowers were tested on summer-fallow land in 1928. The seed was sown during the last week in May, and the varieties cut for ensilage on September 12. The yields were not high, but the stage of maturity reached was above the average for this Station. Mammoth Russian is a tall-growing late maturing variety and contains a comparatively high percentage of water at harvest time. This variety has a considerably higher green weight yield than other varieties, and usually a relatively high dry matter yield. Ottawa 76 usually reaches a suitable stage here for silage and gives a fair yield. Manchurian is about equal to Ottawa 76 in yield, but is usually not so far advanced in maturity. Mennonite is a short-growing variety and will ripen seed in most years at Scott. However, the low yield of this latter variety does not favour it for silage purposes. Schneider is a short-growing low yielding variety as revealed in the following table.

Experiments with summer-fallow substitutes indicate wheat after sunflowers has given lower yields than following corn or other cereal grains. However, corn is not a dependable silage crop for this district. Oats have certain good points as a silage crop but in dry years when silage is most needed they lack the ability to produce a high succulent tonnage. Sunflowers have stood drought better than corn at this Station, and even in the driest seasons have produced comparatively good yields. These advantages have made it the most dependable silage crop for this district.

SUNFLOWERS—TEST OF VARIETIES

Project Ag. 76

Variety	Source	Average height of plants	State of maturity at harvest	Yield per acre 1928	
				Green weight	Dry matter
		in.		tons	tons
Mammoth Russian	Dak. Imp. Seed Co	68	Heads forming	12·27	1·91
Ottawa 76	Cen. Exp. Farm	64	Late milk	11·73	1·78
Manchurian	A. E. McKenzie	61	80% in bloom	10·47	1·66
Mennonite	Rosthern Exp. Station	50	Dough	9·22	1·58
Schneider	Schneider-Scott	45	"	7·83	1·33

FIELD ROOTS

The varieties of field roots tested were sown on summer-fallow land during the last week in May. The seed was sown in rows 36 inches apart, and after emergence the plants were thinned to 12 inches apart in the rows.

MANGELS—TEST OF VARIETIES

Project Ag. 16

Name of variety	Source	Two-year average yield per acre, 1927-28	
		Green weight	Dry matter
		tons	tons
Yellow Intermediate	Cen. Exp. Farm	7·36	0·98
Barres Oval	Gen. Swedish Co	7·73	0·90
Giant Long Red	A. E. McKenzie	6·57	0·80
Yellow Eckendorfer	Gen. Swedish Co	7·23	0·73
Giant Rose	A. E. McKenzie	6·72	0·70
Giant Yellow Globe	A. E. McKenzie	6·34	0·62
Elvetham Mammoth	Hjalmar Hartmann	4·58	0·52
*Danish Sludstrup	James & Bros	9·53	1·20

*1928 yields only.

FALL TURNIPS—TEST OF VARIETIES

Project Ag. 46

Name of variety	Source	Two-year average yield per acre, 1927-28	
		Green weight	Dry matter
		tons	tons
Early Six Weeks	Sutton	16·84	1·37
Pomeranian White Globe	Steele Briggs	15·75	1·32
Greystone	Steele Briggs	15·64	1·30
Purple Top Aberdeen	Sutton	13·66	1·22
Green Top Yellow Aberdeen	Ewing	11·11	1·16
White Globe	Ewing	14·40	1·15
Red Paragon	Sutton	14·11	1·14
Purple Top Mammoth	Steel Briggs	13·99	1·11
Purple Top Mammoth	Sutton	13·80	1·10
Hardy Green Round	Sutton	12·87	1·10

SWEDES—TEST OF VARIETIES

Project Ag. 51

Name of variety	Source	Two-year average yield per acre, 1927-28	
		Green weight	Dry matter
		tons	tons
Improved Yellow Swedish	Gen. Swedish Co	20·63	2·43
Bangholm	Gen. Swedish Co	19·50	2·11
Olsgaard Bangholm	Hjalmar Hartmann	20·78	2·08
Ditmars	McNutt	20·37	2·08
Bangholm	Exp. Farm Kentville	14·56	1·76
Bangholm	Ewing	14·82	1·75
Bangholm	Exp. Farm Nappan	15·34	1·72
Magnum Bonum	Ewing	15·38	1·69
Bangholm	A. E. McKenzie	13·65	1·58
Monarch	A. E. McKenzie	12·04	1·30
*Purple Top	Cen. Exp. Farm	14·40	1·53

*1928 yields only.

Good stands of swedes and fall turnips are secured in most places at Scott, and fairly satisfactory yields harvested. Slightly higher yields are usually obtained from the swedes. The yields of mangels are comparatively low. The chief reason for this is their low germination in this silty loam soil, with stands usually ranging from 35 to 70 per cent. Until there is a greater demand for this class of feed, the production of roots is not likely to become popular in northwestern Saskatchewan, on account of the moderate to low yields and the extra labour involved in growing these crops.

ANNUAL HAY CROPS

Farmers in northwestern Saskatchewan continue to produce the bulk of their hay from annual crops. Information concerning this class of crop is being asked for, and tests are conducted to determine which forage is most suitable for this purpose. Experiments in progress include dates of seeding oats for hay, time of cutting oats for hay, comparison of different annual hay crops, and varieties of peas for hay.

DATES OF SEEDING OATS FOR HAY

Project Ag. 242

Date seeded	Stage of maturity when cut		Yield per acre 1928					
			Alaska			Banner		
	Alaska	Banner	Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
			tons	tons	tons	tons	tons	tons
May 25	Early dough	Early dough	5·84	2·49	2·19	8·04	3·41	3·00
June 1	Early dough	Early dough	5·04	2·13	1·87	10·16	4·44	3·91
June 8	Early dough	Early dough	5·16	2·15	1·89	6·40	2·80	2·46
June 15	Early dough	Early dough	5·20	2·36	2·08	3·16	1·76	1·55
June 22	Early dough	Frozen in milk stage	3·04	1·39	1·22	3·34	2·03	1·79
June 29	Frozen in milk stage.	Frozen in bloom stage.	2·10	1·32	1·16	1·82	1·13	0·99
July 6	Frozen in bloom stage.	Badly frozen	2·52	1·57	1·38	2·40	1·33	1·17

In the dates of seeding experiment an early and late maturing variety are used, represented by Alaska and Banner, respectively. The early maturing variety, while producing lower yields, may be seeded a week to ten days later and yet avoid frost. Over a period of years, it has been observed that yields from different dates of seeding are variable, depending on soil moisture and distribution of rainfall. Destruction of annual weeds on land where oats are to be grown for hay may be continued until the second week in June, with promise of a fair crop before frost occurs.

TIME OF CUTTING OATS FOR HAY
Project Ag. 245

Name of variety	Stage cut	Yield per acre					
		1928 Results			Two-year average 1927-28		
		Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
		tons	tons	tons	tons	tons	tons
Banner	Bloom	8·97	2·68	2·36	13·52	3·53	3·11
Victory	"	10·08	2·73	2·40	13·92	3·44	3·03
Gold Rain	"	9·40	2·83	2·49	13·04	3·31	2·91
Leader	"	9·56	2·65	2·33	13·51	3·19	2·81
Columbian	"	9·23	2·57	2·26	12·58	3·08	2·71
Longfellow	"	8·23	2·27	2·00	11·27	2·73	2·40
Liberty	"	7·06	1·78	1·57	9·76	2·09	1·84
Daubeney	"	5·89	1·42	1·25	8·81	1·89	1·66
Alaska	"	5·53	1·43	1·26	6·82	1·45	1·28
Gold Rain	Milk	8·75	3·03	2·67	11·11	3·55	3·12
Victory	"	8·26	3·10	2·73	10·28	3·44	3·03
Banner	"	8·75	2·93	2·58	10·83	3·38	2·97
Columbian	"	7·61	2·72	2·39	9·96	3·23	2·85
Leader	"	7·71	2·72	2·39	9·96	3·23	2·84
Daubeney	"	6·31	2·16	1·90	9·52	3·10	2·73
Longfellow	"	7·87	2·83	2·49	9·11	3·09	2·72
Liberty	"	7·42	2·58	2·27	9·58	3·05	2·68
Alaska	"	6·83	2·36	2·08	9·33	3·00	2·64
Banner	Dough	6·99	3·25	2·86	8·75	4·27	3·76
Columbian	"	6·44	3·18	2·80	8·14	4·18	3·68
Victory	"	6·86	3·11	2·74	8·46	3·94	3·47
Gold Rain	"	7·51	3·16	2·78	9·26	3·90	3·43
Leader	"	6·67	3·17	2·79	7·76	3·80	3·34
Longfellow	"	6·63	2·81	2·47	8·27	3·76	3·31
Daubeney	"	5·82	2·51	2·21	8·00	3·40	2·99
Liberty	"	6·57	2·50	2·20	8·22	3·32	2·92
Alaska	"	5·50	2·38	2·09	7·10	3·28	2·89

In cutting varieties of oats for hay at different stages of maturity, late varieties have produced higher yields than earlier sorts whether cut in bloom, milk or early dough. Generally speaking, the higher yields of hay are obtained as maturity advances. The bloom stage has a higher percentage of moisture than the dough stage and is, consequently, more difficult to cure.

COMPARISON OF CROPS FOR ANNUAL HAY
Project Ag. 246

Crops	Rate of seeding per acre	Yield per acre					
		Two-year average 1927–28			Four-year average 1925–28		
		Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
	lb.	tons	tons	tons	tons	tons	tons
Banner oats	85	8·59	4·01	3·53	6·83	3·14	2·76
Mackay peas	56	9·63	3·99	3·51	7·04	2·97	2·61
Banner oats	70						
Hungarian millet	30	5·79	2·16	1·90	5·10	1·88	1·65
Siberian millet	30	6·33	2·15	1·89	5·46	1·85	1·63
Prolific spring rye	70	8·31	2·02	1·78	5·94	1·73	1·52
Feeder barley	96	7·94	3·44	3·03	.....	.....	.....
Alaska oats	85	7·85	3·27	2·88	.....	.....	.....
Chancellor peas	40				.....	.....	.....
Alaska oats	56	8·30	3·09	2·72	.....	.....	.....
*Common millet	30	3·30	1·31	1·15	.....	.....	.....
*Hog millet	30	3·31	1·06	0·93	.....	.....	.....
*Japanese millet	30	2·71	0·86	0·76	.....	.....	.....

*1928 yields only.

A comparison of annual hay crops shows that a late oat (represented by Banner) exceeds all others in amount of forage produced. Millets lack dependability for annual hay and produce less yield than oats or barley. Spring rye produces good stands, but is low in yield and quality for annual hay. The quality of oats may be improved for annual hay, with little difference in yield, by growing in combination with field peas.

VARIETIES OF PEAS FOR HAY
Project Ag. 247

Name of variety	Stage of maturity when cut	Average length of vine	Yield per acre 1928		
			Green weight	Cured hay	Dry matter
		in.	tons	tons	tons
Mackay O. 25	Pods formed	46	5·96	1·38	1·21
Dashaway, Sask. 625	"	36	5·74	1·28	1·13
Arthur O. 18	"	42	4·86	1·13	0·99
Chancellor O. 26	"	32	4·48	0·95	0·84

Field peas, when sown alone as an annual hay crop, are decidedly inferior at this Station. Unless peas produce a vigorous growth from the start they become infested with weeds. Difficulty in cutting and curing is a decided disadvantage.

PERENNIAL AND BIENNIAL HAY CROPS

Previous experiments with biennial and perennial hay crops have shown that sweet clover and western rye grass are the most dependable and satisfactory for this area, and our work is therefore confined to these two crops.

Last winter, hardy strains of alfalfa when tested alone, and in combination with grasses, winter-killed, while Arctic sweet clover under identical conditions came through and produced satisfactory crops. In open fields, alfalfa invariably winter-kills and the only places where the crop will winter over is in low places where snow collects, or where snow collects near trees. Arctic is the only existing dependable variety of sweet clover for this district.

METHODS OF SEEDING SWEET CLOVER
Project No. Ag. 162

Source	Depth of seeding	Seed treatment	Yield per acre 1928		
			Green weight	Cured hay	Dry matter
			tons	tons	tons
Steele Briggs	1½ inches deep	Scarified	7·19	1·86	1·64
Scott	1½ "	"	9·08	2·38	2·09
Scott	¾ "	"	9·50	2·49	2·19
Scott	2¼ "	"	8·38	2·14	1·88
Scott	1½ "	Unscarified	9·32	2·48	2·18
Scott	1½ "	With pods on	7·76	2·24	1·97

Home-grown seed of sweet clover produced better stands and a higher yield than commercial seed, in a one-year test. In seeding at different depths there is practically no difference in yield from shallow, medium and deep seedings, as indicated in the above table. It is more interesting to note that unscarified seed produced a yield equal to that from scarified seed, but the crop was

a week later in blossoming. A remarkably good yield was obtained by seeding sweet clover with pods on the seed; but the crop was almost ten days later than that from scarified seed.

Western rye grass seeded with alfalfa on left and sweet clover on right.

WESTERN RYE GRASS—TEST OF STRAINS FOR YIELD

Project Ag. 221

Strain No.	Two-year average yield per acre, 1927-28		
	Green weight	Cured hay	Dry matter
	tons	tons	tons
77	4·70	1·80	1·58
28	4·58	1·80	1·58
97	4·39	1·73	1·52
114	4·27	1·70	1·50
86	4·08	1·64	1·44
124	3·88	1·63	1·43
99	4·04	1·60	1·41
83	3·78	1·53	1·35
4	3·98	1·52	1·34
25	3·87	1·51	1·33
84	3·84	1·50	1·32
100	3·82	1·50	1·32
15	3·81	1·50	1·32
54	3·81	1·50	1·32
Commercial	3·91	1·49	1·31

Fifty-five strains of western rye grass are being tested at this Station, but only those which show yields equal to, or higher than Commercial, are listed in this report. While differences are known to exist in these strains in habit of growth, colour of foliage, maturity and yield, a comprehensive study, involving other factors, is in progress to determine which is the best strain for conditions in this area.

POULTRY

The Barred Plymouth Rock is the only breed of poultry kept at the Scott Station. Pedigree breeding is conducted with a limited number of individuals. Eggs from pedigree hens are marked and placed in wire-baskets before hatching and the chicks are marked as soon as removed from the incubator.

The stock on hand December 1928 consisted of 225 pullets, 56 yearling hens, 26 two-year old hens and 24 male birds. The pullets are divided into nine pens of twenty-five each for feeding tests. The yearling hens have an average record of 212 eggs. Twenty-seven have records of 220 or over; seventeen, 230 or over; ten, 240 or over and four, 250 or over. The four highest records for 1928 are 258, 269, 273 and 278.

HENS VS. PULLETS FOR HATCHING EGGS

Records are kept of eggs from hens and pullets to determine their relative value for hatching.

HATCHING RESULTS—HENS VS PULLETS

—	Total eggs set	Per cent fertile	Per cent total eggs hatched	Per cent fertile eggs hatched	Per cent chicks hatched alive at three weeks	Total eggs required for one chick hatched	Total fertile eggs for one chick hatched	Total eggs required for one chick at three weeks
Hens	1,013	93·78	76·80	81·89	95·11	1·30	1·22	1·36
Pullets	834	93·64	46·88	50·06	91·56	2·13	1·99	2·32

These results indicate that hens' eggs should be used for incubation as far as possible. These hens were hatched in 1926 and the pullets in 1927.

Five incubators with a total capacity of 975 eggs are used and have been ample for hatching about 1,000 chicks early in the season; but space and equipment have not been available to date to make possible custom hatching or the hatching of chicks for sale from the incubators. In 1928, 1,847 eggs were set and 63 per cent of all eggs set were hatched, and of all chicks taken from the incubator 95 per cent were alive. These were thrifty at three weeks when wing-banded and there were very few losses after this time. The low mortality of young chicks may be partly due to the fact that a blood sample is taken from every bird in the breeding flock, annually, and tested for bacillary white diarrhœa and all re-actors removed from the flock.

Hard coal brooder stoves were used for brooding. The stoves were surrounded with short boards hinged in pairs while the chicks were small. These were placed about 2 feet from the outside of hover at first to prevent chicks from wandering too far and becoming chilled.

METHOD OF FEEDING YOUNG CHICKS

No chicks were taken from the incubator until all hatching was complete, which was on the twenty-second day. No feed was given for forty-eight hours after taking from the incubator. The feed used at this Station consisted of

equal parts of finely cracked wheat, corn and hulless oats, fed dry on a clean smooth floor or on a piece of heavy paper. One ounce of feed for fifty chicks was allowed five times per day. After the first week, a dry mash was used to replace one of the five feeds each day. It was left on a paper before the chicks for only a few minutes the first day and longer each day until they were receiving all that they would take from a self-feeder, at the age of approximately three weeks. This mash was made up of one part each of bran, shorts, cornmeal and oat chop (sifted or hulless), and one-half part beef scrap and one-quarter part bone meal. As soon as the chicks were eating well from the hopper, the cracked grain was gradually increased in quantity and fed less frequently until they were receiving it only morning and evening in the litter or outside.

Sunflowers in rows 36 inches apart provide excellent shade for poultry.

Until the chicks were able to be outside, green feed was supplied in the form of sprouts from oats, allowing the sprouts to become 2 or 3 inches high and cut off with large shears and chopped fine before feeding. All changes in feeding were made gradually. Milk given was either sweet or sour each day, and several days were taken in changing from milk to water, or from water to milk.

CULLING WORK, JUDGING AND SALE OF STOCK

During the autumn of 1928 twenty farm flocks in the district adjacent to the Station were culled by the poultryman with a view to assisting farmers to improve their own flocks. In addition to this the poultryman attended the Saskatchewan Poultry Conference at Saskatoon, spoke at farmers' meetings at Luseland and Rosetown, and judged poultry at the Wilkie, Unity, Cut Knife and North Battleford summer fairs.

The demand for breeding stock almost invariably exceeds the supply. One hundred and fourteen hens, 230 pullets and 59 cockerels were sold in 1928 to farmers in the territory served by the Station.

CAPONS

Some enquiries have been received regarding the raising of capons and a test was made in order to give first-hand information to farmers.

Eight cockerels were caponized when weighing slightly less than 2 pounds each. Eight other cockerels of the same total weight were selected. They were all allowed to run with the flock with a view to approaching farm conditions. At the end of 165 days the eight capons weighed 56 pounds and the eight cockerels weighed 47 pounds or an average of approximately 1 pound difference per bird. The quality of the meat was improved by caponizing and had the birds been crate-fed for a time the capons might have made a better showing; but this test would indicate that the operation is not advisable for average conditions, unless there is a special demand and an increased price paid for capons.

EGG PRESERVATIVES

Barral compound and Columbus egg-preservative have both given excellent results. Water-glass was used as a check and all eggs were in good condition after 177 days storage. The Columbus preparation has one advantage in that after three days the eggs may be removed from the solution and kept indefinitely in a common egg-case.

COST OF WINTER EGG PRODUCTION

Records of quantities and prices of all feeds consumed, with records of all eggs produced and prices at the season when laid, make it possible to show the exact returns over and above feed costs. This test covers a six months' period beginning with November 11, 1927, and ending with May 10, 1928.

FEED COSTS FOR WINTER EGG PRODUCTION

Number of pullets	Total eggs laid	Value	Total cost of feed	Average cost per dozen	Returns over cost of feed
		$	$	cts.	$
200	18,920	508.00	216.00	13·7	292.00

The value of eggs was based upon the market price at the time at which they were laid. Few people doubt the profit to be made from poultry, during the summer, when capable of reproducing at the rate of over 400 per cent, as was the case at this Station in 1928. The average farm flock is sometimes a losing proposition during the winter but the returns over and above feed in this case amount to $1.46 per bird.

EXPERIMENTAL FEEDING FOR EGG PRODUCTION

The following experiments cover a period of six months except in the case of the heated-house experiment.

COMMERCIAL VS. HOME-MADE MASH

A commercial mash known as Radio laying mash was compared with a home-made mash consisting of equal parts by weight of shorts, bran, barley chop, oat chop and beef scrap and to each hundred pounds of the mixture one-quarter of a pound of salt and 2½ pounds of charcoal were added. These feeds were kept before the birds in the self-feeder and all other conditions were identical.

COMMERCIAL VS HOME-MADE MASH

—	Total cost of feed per bird	Eggs laid per bird	Value of eggs	Feed cost per dozen	Returns per bird over cost of feed
	$		$	cts.	$
Commercial Mash	1 27	93	2 44	16·0	1 17
Home-made Mash	0 96	99	2 65	11·7	1 69

These results agree with those obtained in a previous test showing the home-made mash to be more satisfactory for egg-production. It will be noted that the chief difference is the cost of the feeds although the returns were 19 cents per bird higher in the case of the home-made mash. The cost of the Radio laying mash was $3.50 per hundred and that of the home-made mash was $2.08 per hundred.

HOME-MADE VS. HOME-GROWN MASH

In this test the purpose is to compare the standard mash mentioned in the previous experiment, with a mixture which could be made up on the average farm without buying any mill feeds, such as shorts and bran.

The home-grown mash consisted of two parts of feed wheat chop and one part of each of the following: oat chop, barley chop and beef scrap with the same addition of salt and charcoal as used in the standard mash referred to in the first-mentioned experiment.

HOME-MADE VS HOME-GROWN MASH

—	Total cost of feed per bird	Eggs laid per bird	Value of eggs	Feed cost per dozen	Returns per bird over cost of feed
	$		$	cts.	$
Home-made Mash	0 96	99	2 65	11 7	1 69
Home-grown Mash	1 15	104	2 79	13 0	1 64

This is the first test comparing these two mixtures. The home-made mash has reduced the cost of feed, but the number of eggs were also reduced, so that the net returns were practically the same. The test is being repeated to verify results.

BEEF SCRAP VS. FISH MEAL

A test was made to determine the value of these two protein supplements for laying pullets. The standard mash was used in each pen, with the exception that the fish meal replaced the beef scrap in one case.

BEEF SCRAP VS FISH MEAL

—	Total cost of feed per bird	Eggs laid per bird	Value of eggs	Feed cost per dozen	Returns per bird over cost of feed
	$		$	cts.	$
Beef scrap	0 96	99	2 65	11·7	1 69
Fish meal	1 05	109	3 00	11·7	1 95

The egg production and returns per bird were higher in the case of the fish meal; but it should be added that the fertile eggs were 2 per cent lower and the total eggs hatched were 28·5 per cent lower in the case of the fish meal. The test is being repeated.

HULLESS VS. COMMON OATS

To determine the relative value of hulless and common oats in the laying mash, a test was made by feeding two pens the same in every way, except that the common oat chop was replaced by an equal weight of hulless oat chop in the mash and scratch grain.

HULLESS VS COMMON OATS

—	Total cost of feed per bird	Eggs laid per bird	Value of eggs	Feed cost per dozen	Returns per bird over cost of feed
	$		$	cts.	$
Hulless oats	1 01	99	2 66	12·0	1 65
Common oats	1 15	98	2 63	14·0	1 48

This test shows the hulless oats to be a superior feed, as indicated by a lower cost per dozen eggs and an increased net return per bird of 17 cents. A similar test made one year previous showed practically no difference in the value of the two feeds. The fertility was lower in the case of the hulless oats in the first test, and in this case the eggs from the common oat lot were 93·5 per cent fertile; but in the case of the hulless oat lot the fertility was only 86·2 per cent. A third test of these mixtures is under way.

BEEF SCRAP VS. MILK POWDER

To determine the value of skim-milk powder as a protein supplement, a test was made with two pens of pullets fed the same rations, excepting that in one case the beef scrap was replaced by 7 per cent milk powder. The beef scrap was fed at the usual rate of 20 per cent of the mash. The reason for reducing the quantity of milk powder was that the cost was $13.50 per hundred pounds. It was found, however, that the milk powder lot laid only seventy-nine eggs per bird as compared with ninety-eight eggs in the check lot. The feed cost per dozen was 16 cents in the milk powder lot and 14 cents in the check lot. The protein content of the beef scrap was 60 per cent and that of the milk powder was only 38 per cent. The experiment is under way again and sufficient milk powder is being used to make up an amount of protein equal to that given in the beef scrap.

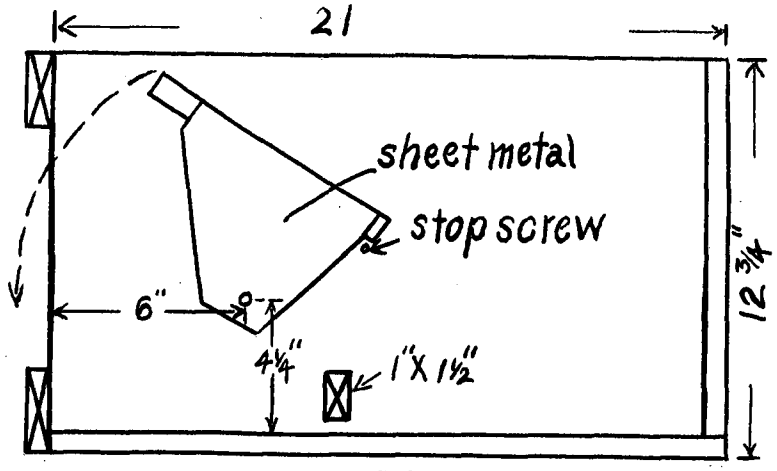
ARTIFICIAL HEAT FOR LAYING HOUSE

An attempt was made in 1927-28 to avoid the low temperatures in the laying house during the winter by the use of artificial heat. The egg-production in this house was compared with an unheated pen which received the same feed. In the heated house the temperature was seldom allowed to drop below freezing during the day. This experiment covers a period of only five months.

—	Total cost of feed per bird	Eggs laid per bird	Value of eggs	Feed cost per dozen	Returns per bird over cost of feed
	$		$	cts.	$
Cold house	1 01	87	2 33	14·0	1 32
Heated house	1 02	76	2 16	16·0	1 14

The feed cost per dozen eggs was raised 2 cents in the heated house and the returns per bird over total cost were 18 cents lower per bird in the heated pen. It is remarkable to note that the egg-production was lower in the heated pen. The test is being repeated during the winter of 1928-29 to verify results.

Enquiries are frequently received as to how a simple trapnest may be constructed. A cut of a common type is shown in this report for the convenience of breeders beginning to trapnest their poultry flock.



Trap nest. Scale 2″ to 1″.

APICULTURE

WINTERING

The winter of 1927-28 was very severe for bees packed in cases outside. The important difference from the usual conditions was the lack of protection from snow covering. The colonies were in splendid condition in the fall and were packed in the usual way, with from 6 to 12 inches of straw inside the cases. Those which perished had an abundance of stores left and the cause of loss was thought to be low temperatures in the hive. All colonies wintered in the cellar were in good condition in the spring. Several surplus queens were wintered in the cellar. by placing a division board in the centre of the brood-chamber and a queen on each side with a few frames of bees.

WEATHER CONDITIONS AND HONEY FLOW

The spring of 1928 was favourable for bees. The cellar wintered colonies were brought from the cellar on April 24 and on the following day had a good cleansing flight. Pollen gathering began almost at once from the native crocus,

which was soon followed by the native buttercup, maple, caragana and fruit bloom. Thus brood-rearing was encouraged from the first. The main flow was from white sweet clover from July 1 to August 10. The highest yield from one colony was 125 pounds of extracted honey and the greatest storage in one day, by a colony on scales, was 13 pounds on July 29.

PACKAGE BEES AS A MEANS OF STARTING COLONIES

Two 3-pound packages of bees and two 2-pound packages were received from Alabama on May 10 and a duplicate order was received on May 21. The total extracted honey stored by the four early established colonies was 102 pounds. The colonies established on May 21 stored 168 pounds.

In previous years the difference has not been marked, but considerable difficulty was experienced this year from the failure of queens in the case of the early shipments. Upon visiting a number of apiaries in the district, it was found that the same condition prevailed. A queen-breeder in Alabama stated that unfavourable weather conditions in Alabama in the early part of the season was the cause of the unsatisfactory queens. It should be added that 1928 was the first season that failing queens have been numerous enough, at this Station, to cause any serious inconvenience.

OVER-WINTERED VS. PACKAGE BEES

The two over-wintered colonies on this test averaged 57 pounds of extracted honey. The average amount stored by all package colonies was 37 pounds.

PACKAGE BEES AS A MEANS OF STRENGTHENING COLONIES

Six colonies were used for this experiment. Two colonies were covering only 2½ frames; two colonies were covering only 3 frames and two colonies were covering 3½ frames. To one colony of each pair above mentioned a 2-pound queenless package was added and the other colony of the same strength was left as a check. The three strengthened packages stored a total of 253 pounds of honey, while the three check colonies stored a total of only 88 pounds.

RELEASING PACKAGE BEES

Of the several methods tried in releasing package bees, the following plan is preferred at this Station and recommended for general use. A full depth super of drawn comb and some stores are prepared by removing five frames to make room for the package, and the entrance is reduced to 2 or 3 inches in length. The queen is removed from the package and placed in a "push in" cage where she has access to uncapped stores. The package is opened and placed on one-inch blocks on the floor with the opening down and the hive-cover is put in place. The package may be removed as soon as it is empty and the space refilled with drawn combs or foundation.

METHODS OF DETECTING PREPARATIONS FOR SWARMING

The "tipping the super" method of detecting preparations for swarming has again proven entirely satisfactory at this Station. The method consists of placing a shallow super, containing drawn combs, above the brood-chamber and placing the queen excluder above this super. It has been found that if the colony is preparing to swarm, queen cells will be built on the bottom bars of the frames in the shallow super, and may be seen by merely tipping the super from the back. This renders it unnecessary to remove each frame in the brood-chamber in search of queen cells.

TREATMENTS FOR SWARMING

Swarming is not permitted at the Scott Station, as it is considered more advisable to increase by division. There are two common methods of swarm control: (1) Dequeening and requeening; (2) Separation of queen and brood. In following the first mentioned method, the queen is removed and all queen cells are destroyed. The colony is left queenless for ten days when all queen cells are again destroyed and a young laying queen in introduced. Two colonies were treated by this method at Scott during the season of 1928 and no further signs of swarming were evident during the season. The second mentioned method, "separating queen and brood", is preferred by many beekeepers, on the grounds that it is more easily done and is very effective. The procedure is to destroy all queen cells and move all brood to an empty super above the honey super, leaving only one frame of stores in the lower chamber with the old queen. The remainder of the brood-chamber is filled with drawn comb or foundation. At the end of a week all queen cells are again destroyed, these are to be found in the old brood-chamber above. As soon as the larvae hatch out in the old brood-chamber, the combs are cleaned by the bees and used for storage of honey. Five colonies were successfully treated for swarming by this method in 1928.

QUEEN REARING AND GENERAL NOTES

Weather conditions were not favourable for the early mating of queens. Fourteen queens were successfully raised and mated during the season, all of which layed satisfactorily. In addition to these new queens, a few were purchased from queen-breeders in Alabama and in some instances natural supersedure occurred but no swarming. The method of detecting supersedure is to keep a wing of each old queen clipped and any unclipped queen is known to be new.

Extracting was done as soon as the honey flow ceased, and feeding of sugar-syrup for winter stores began immediately.

After considerable experimentation with different kinds of pail-feeders and Miller feeders, it has been found that the most rapid and most satisfactory feeding was done by the use of 10-pound honey pails carefully resoldered at the seams to avoid any danger of leaking on account of flaws in manufacture. It has, also, been found inadvisable to attempt to use old cans of various sizes and of questionable quality, as a leak may not be noticed until a great number of bees have been drowned.

EXTENSION AND PUBLICITY

An educational exhibit from this Station was in attendance at seven summer fairs in northwestern Saskatchewan. These were Rosetown, Kerrobert, Kindersley, Meeting Lake, Lloydminster, North Battleford and Glenbush. Two representatives were present to discuss farm problems and results obtained from experimental work at this Station. These persons assisted in judging at the fairs. The estimated attendance of 65,350 persons had an opportunity to view the exhibit, discuss agricultural work and obtain agricultural literature. Results of this exhibit are frequently reflected in correspondence.

Five agricultural field days by farmers from northwestern Saskatchewan, and two from northeastern Alberta visited the Station during the summer. In addition, a special day for registered seed growers, and another by beekeepers were held to examine their respective problems.

While casual visitors are welcomed, organized field days with hours set apart to permit the staff to arrange their work, and also accommodate visitors, are more saatisfactory for all concerned.

OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1929.