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 1930

Influence of phosphate fertilizer on weeds and maturity of wheat.

Published by Authority of the Hon. Robert Weir, Minister of Agriculture,
Ottawa, 1931

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DOMINION EXPERIMENTAL STATION, SCOTT, SASK.

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

SEASON

Drought and wind were the serious crop hazards in the spring of 1930. Dry subsoil conditions prevailed when spring opened, and except for light showers there was no rain until June 21. Spring windstorms were frequent. On April 14 over 1,000 miles of wind blew, which gave an average of over 40 miles per hour. For the succeeding two months, six windstorms occurred totalling 278 hours.

These two factors seriously affected all crops in this area. As spring progressed, sweet clover plants literally dried up and western rye grass turned brown, but recovered its green colour with June rains. A few Russian poplar, many Manitoba maple and practically all willow trees died, apparently from drought. A number of crab apple and plum trees suffered the same fate, and the blooming period of shrubs was exceedingly short. Surface moisture soon disappeared in the spring as winds increased and soil drifting became a serious menace in certain fields. No soil drifting occurred on the Station. An unusual feature of late spring was eleven and a half degrees of frost on May 22 which nipped the leaves of growing grain, blackened emerging leaves of deciduous trees, and brought death to flowers in bloom.

Midseason was favourable for crop production. From the middle of June and continuing through July, light showers were frequent and winds were moderate. Fall rye was a poor crop, but yields of spring grains were slightly higher than the average for the past eighteen years.

Harvest operations continued with slight weather delays until the first week in October. An inch of snow fell on October 8 to be followed by a snow storm of 53 hours' duration centering around the middle of that month. At this time, approximately 25 per cent of the grain remained unthreshed within a radius of ten miles. Fortunately the snow disappeared and the grain was threshed in November but graded tough. December established high records for minimum and mean temperatures. The year closed with practically no snow on the ground and with roads open for motor traffic.

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TABLE 1.—METEOROLOGICAL RECORDS, 1930

Month	Temperature °F.						Precipitation				Sunshine		Wind		Evaporation	
	Maximum		Minimum		Mean											
	Highest	Mean maximum	Lowest	Mean minimum	1930	Average 19 years	Rain	Snow	Total 1930	Average 19 years	1930	Average 19 years	1930	Average 8 years	1930	Average 8 years
	°	°	°	°	°	°	in.	in.	in.	in.	hours	hours	miles	miles	in.	in.
January	21·0	1·30	−45·0	−16·14	8·72	−1·20	.....	6·75	0·68	0·56	69·9	87·5	9,662	8,985	.....	.....
February	43·4	23·91	−34·0	6·09	15·00	3·99	0·36	2·25	0·59	0·49	90·8	116·0	8,732	8,343	.....	.....
March	49·6	32·56	−14·0	13·88	23·22	15·59	.....	4·00	0·40	0·57	179·3	159·6	9,367	9,798	.....	.....
April	68·2	54·96	11·3	29·92	42·44	37·23	0·38	.....	0·38	0·91	210·5	208·9	10,740	9,822	.....	.....
May	77·7	60·37	21·2	34·84	47·61	49·06	0·36	0·13	0·38	1·31	232·5	262·6	12,887	10,653	6·46	4·88
June	92·0	68·25	30·0	46·01	57·13	57·42	2·79	.....	2·79	2·22	225·7	268·8	11,547	9,485	5·25	4·22
July	88·8	75·90	41·5	49·97	62·94	59·13	2·45	.....	2·45	2·31	331·4	308·4	7,331	8,401	5·24	5·47
August	92·5	77·04	28·0	48·63	62·84	60·32	1·08	.....	1·08	1·79	290·3	265·3	7,994	7,881	4·47	4·30
September	86·4	63·36	21·3	38·38	50·87	49·78	1·38	.....	1·38	1·40	173·8	181·2	9,999	8,553	2·50	2·79
October	69·4	43·14	−5·6	24·50	33·82	37·71	0·56	5·75	1·14	0·64	136·9	146·4	8,908	9,975	.....	.....
November	53·9	36·71	−2·5	16·75	26·73	22·56	.....	4·00	0·40	0·38	114·0	102·1	8,585	8,323	.....	.....
December	42·0	29·24	−10·8	10·98	20·11	7·60	0·04	3·50	0·39	0·51	74·8	79·1	8,212	8,770	.....	.....
Totals	.....	.....	.....	.....	.....	.....	9·40	26·38	12·06	13·09	2,129·9	2,185·9	113,964	108,989	23·92	21·66

TABLE 2—DATES OF FARM OPERATIONS—1930

Farm operations	Began	Finished
Spring operations—		
Spring ploughing	April 7	May 13
Harrowing	" 7	" 15
Packing	" 8	" 7
Cultivating	" 9	April 24
Seeding wheat	" 17	May 1
Seeding oats	May 3	" 14
Seeding barley	" 14	" 15
Summer-fallow operations—		
Ploughing	May 17	June 5
Packing	" 17	" 6
Harrowing	" 20	Sept. 30
Cultivating	June 16	Oct. 1
Disking	July 10	" 6
Harvest operations—		
Cutting hay—rye grass	July 18	July 31
Cutting sweet clover	" 8	Aug. 16
Cutting wheat—*Marquis	Aug. 12	Sept. 3
Cutting wheat—Garnet	" 15	Aug. 15
Cutting wheat—Reward	" 16	" 28
Cutting oats—Banner	" 18	Sept. 4
Cutting barley	" 7	Aug. 27
Cutting fall rye	Sept. 3	Sept. 3
Threshing	Aug. 23	Oct. 3
Seeding sunflowers	May 15	May 17
Cutting sunflowers	Sept. 1	Sept. 3
Filling silo	" 1	" 3

*Marquis fields sown with phosphate fertilizer were cut in advance of Garnet

ANIMAL HUSBANDRY*

HORSES

At the beginning of December, 1930, the horses at this Station totalled 29. The greater percentage of these are registered Percherons, descending from four purebred mares obtained some ten years ago. No foals were raised in 1930 but three mares were bred to a Percheron stallion, Carnoter —13287—, for 1931 foals. A level teaspoonful of potassium iodide is given to the pregnant mares in their feed twice per month, to aid in the prevention of joint ill.

CATTLE

The breeding herd on December 1, 1930, was composed of 41 dual purpose Shorthorns. The herd sire for the greater part of the year has been Red Marquis —156496—, which has recently been transferred to the Swift Current Station. He has left 21 male and 21 female calves since he was received in the autumn of 1927, and 6 more of his calves are expected. Red Marquis is an outstanding individual from one of the leading dual purpose Shorthorn herds in Eastern Canada. One of his heifers sold at auction in Quebec in 1930 for over $400.

The present herd sire is Neralcam Star —171592—, originally from the same herd as Red Marquis and has been used for some time at the Brandon Experimental Farm, from where he was transferred to Scott.

A few of the cows are sold each autumn to farmers in the district as the young, more productive individuals are ready to take their places. The demand for these cows as well as young bulls, has always exceeded the supply. The herd is tested regularly for tuberculosis and infectious abortion. In addition to the breeding herd, 25 grade Hereford yearling steers were purchased for feed trials during the winter of 1930-31. No steers were fed the previous year.

The accompanying table shows the individual feed and production records for cows finishing lactation periods in 1930. The average values of feeds used during the period were as follows:—

Oats, 55 cents per bushel.
Barley, 57 cents per bushel.
Bran, $1.95 per hundred.
Oilcake meal, $3.50 per hundred.
Sunflower silage, $3.50 per ton.
Prairie hay, $10 per ton.
Pasture, $1 per head per month.

The meal mixture used during the winter months consists of 30 pounds oat chop, 30 pounds bran, 20 pounds oilcake meal and 15 pounds barley chop. The amount varies from 5 to 10 pounds per head per day.

In the annual milk production statement, the average price of butterfat was placed at 30 cents per pound by taking the average price paid at the local creamery for the twelve months ending December 31, 1930.

*Under the supervision of E. Van Nice, B.S.A.

TABLE 3.—ANNUAL MILK PRODUCTION STATEMENT

Name of Cow	Number of lactation period	Number of days in milk	Total milk yield	Average per cent. fat in milk	Total fat	Amount of meal eaten at 2·3 cents per pound	Amount of silage eaten at $3.50 per ton	Amount of hay eaten at $10 per ton	Months on pasture at $1 per month	Total cost of feed for period	Feed cost of milk per cwt.	Butter fat at 30 cents per pound	Returns less cost of feed
			lb.	p.c.	lb.	lb.	lb.	lb.		$ cts.	$ cts.	$ cts.	$ cts.
Scott Prairie Rose	2	302	7,813	4·1	320·3	2,678	3,041	3,020	4	86 01	1 10	96 09	10 08
Scott Qu'Appelle 2	2	385	7,358	4·4	323·8	3,201	4,257	3,850	4	104 32	1 42	97 14	— 7 18
Scott Countess	1	455	6,931	4·3	289·0	3,847	4,950	4,550	4	123 89	1 79	86 70	—37 19
Scott Qu'Appelle	1	376	6,187	4·2	259·9	3,157	5,035	3,760	4	104 22	1 68	77 97	—26 25
Scott Pride 2	4	275	5,371	4·2	225·6	2,338	2,093	2,750	4	75 18	1 40	67 68	— 7 50
Jess Mayflower 2	8	339	5,358	3·6	192·9	2,925	3,399	3,390	4	94 18	1 76	57 87	—36 31
Prairie Red Rose 26	1	279	5,082	4·2	213·4	2,207	2,583	2,790	3	72 23	1 42	64 02	— 8 21
Pride of Qu'Appelle 11	2	331	4,776	3·4	162·4	2,872	3,426	3,310	4	92 61	1 94	48 72	—43 89
Scott Millie	1	307	4,294	3·6	154·6	2,455	2,480	3,070	4	80 16	1 87	46 38	—33 78
Scott Prairie Rose 2	3	341	3,854	3·6	138·7	2,940	3,399	3,410	4	94 62	2 46	41 61	—53 01
Scott Rosebud	2	327	3,794	4·5	170·7	2,773	5,345	3,280	4	93 53	2 47	51 21	—42 32
Scott Red Rose 2	3	289	3,791	4·0	151·6	2,532	3,087	2,890	3	81 09	2 14	45 48	—35 61
Total	.....	4,006	64,609	48·1	2,602·9	33,925	43,095	40,070	50	1,102 04	21 45	810 87	—321 17
Average	.....	334	5,384	4·0	216·9	2,827	3,591	3,339	4	91 84	1 79	67 57	— 26 76

The annual milk production statement shows an average loss of $26.77 per head but it should be remembered that this is from milk only—a basis upon which a straight beef herd is never measured, and that the young stock from these dual purpose cows compare favourably with straight beef bred Shorthorns as far as beef production is concerned. As the selection for higher milk production advances, it is possible that beef type may be sacrificed to a small degree, but an inspection of this herd at present would convince the observer that the sacrifice of beef type so far is almost imperceptible.

SHEEP

The flock of 128 sheep on hand December 1, 1930, includes three breeds—Shropshire, Cheviot and Rambouillet. The grade stock is reduced each autumn to 20 or 25 breeding ewes of each breed, and the ewe lambs are usually used on feeding trials each winter. Pure bred rams of each of the three breeds are used and there are from three to eight pure bred ewes of each of the three breeds on hand.

WOOL

From 101 sheep sheared in June, 1930, 935 pounds of wool was obtained. The average clip from the mature animals of the three breeds was 11·94 pounds from the Rambouillet, 9·23 pounds from the Shropshire and 7·95 pounds from the Cheviots. The quality of the Rambouillet wool is much superior to the wool from the other two breeds and the Cheviot wool invariably grades lowest of the three. The Rambouillet is slower to mature and is not considered as desirable for mutton as the Shropshire or Cheviot, but usually sells for the same price when in the same condition.

FROZEN WHEAT VS OATS FOR LAMBS

During the winter of 1929-30, 34 lambs were fed in two equal lots on a medium ration of the respective feeds for a period of 117 days. The roughage consisted of sunflower silage and oat straw. The frozen wheat would grade No. 6 and the oats 3 C.W. They were both fed whole.

TABLE 4—FROZEN WHEAT VS. OATS FOR LAMBS

—		Frozen wheat	Oats
Number of lambs in lot		17	17
Initial gross weight	lb.	1,349	1,345
Initial average weight	"	79·4	79·1
Finished gross weight	"	1,628	1,686
Finished average weight	"	95·8	99·2
Total gain in 117 days	"	279	341
Average gain per head	"	16·4	20·1
Quantity of oats eaten, at 2·2 cents per pound	"	.....	2,757
Quantity of wheat eaten, at 1·1 cents per pound	"	2,757	.....
Quantity of silage eaten, at $3.50 per ton	"	1,641	1,641
Quantity of oat straw eaten, at $2 per ton	"	3,302	3,302
Total cost of feed	$	37 19	67 52
Grain required per 100 pounds gain	lb.	988	808
Cost of feed per 100 pounds gain	$	13 33	19 80

Oats have produced the greater gains in this case, but on account of the comparative price per pound, have not been as economical to feed as the frozen wheat. This experiment is being repeated during the winter of 1930-31 to verify the results and assist in establishing relative values for the two feeds.

The price of grain shown in the table is for whole grain as it was fed, but in the swine feeding trials reported on the following pages, the prices given for grains include $1.50 per ton for crushing.

SWINE

Twenty-one Yorkshire brood sows and three males make up the breeding herd at this Station on December 1, 1930. The sires used for the 1930 pigs were Fairview Masterpiece—139644—and Count 161F—134831. Breeding stock is supplied to farmers as desired, when the requests are made sufficiently early.

A mineral mixture kept before the growing hogs consists of 2 pounds sulphur, 5 pounds hydrated lime, 20 pounds salt and 75 pounds fine, soft coal. For the pregnant sows, three ounces of potassium iodide is dissolved and sprinkled over the salt before mixing, with a view to preventing hairlessness in the young pigs.

WINTER FEEDING EXPERIMENTS

Sweet Clover Hay for Growing Pigs

Fourteen fall pigs were divided into two lots and fed the same grain ration. Lot 1 received approximately 1 pound of sweet clover hay per head per day, and lot 2 received none.

TABLE 5—SWEET CLOVER HAY VS. NONE

		Lot 1	Lot 2
		Sweet clover	No sweet clover
Number of pigs in each lot		7	7
Initial gross weight of each lot	lb.	394	392
Initial average weight	"	56·3	56·0
Final gross weight of lot	"	1,375	1,412
Final average weight	"	196·4	201·7
Total gain of lot during test (120 days)	"	981	1,020
Average gain per pig	"	140	145·7
Hay consumed, at $12 per ton	"	877	.....
Oat chop consumed, at 2·3 cents per pound	"	2,179	2,179
Barley chop consumed, at 1·2 cents per pound	"	1,145	1,145
Bran consumed, at 1·9 cents per pound	"	412	412
Oilcake meal consumed, at 3·5 cents per pound	"	206	206
Tankage consumed, at 2·8 cents per pound	"	206	206
Mineral mixture consumed, at 72 cents per cwt	"	220	220
Total quantity of meal consumed	"	4,148	4,148
Meal required per 100 pounds gain	"	423	407
Total cost of feed	$	91 51	86 25
Cost of feed per 100 pounds gain	$	9 33	8 46
Returns per head at $10 per cwt. less cost of all feed	$	6 57	7 85

This is the first test of sweet clover for this purpose at this Station and should be repeated before any conclusions are drawn.

Oats and Frozen Wheat vs Oats and Barley vs Oats Alone

Three lots of seven pigs each were used for this experiment covering a period of 90 days. The grain was fed as chop in every case and in lots 1 and 3 the wheat and barley chop made up one-quarter of the mixture at first and was increased near the end of the period to equal parts with oats.

TABLE 6—OATS AND FROZEN WHEAT VS. OATS AND BARLEY VS. OATS ALONE

—		Lot 1 Frozen wheat and oat chop	Lot 2 Oat chop alone	Lot 3 Barley and oat chop
Number of pigs in each lot		7	7	7
Initial gross weight of each lot	lb.	389	389	394
Initial average weight	"	55·6	55·6	56·3
Final gross weight of each lot	"	1,145	1,084	1,123
Final average weight	"	163·6	154·9	160·4
Total gain of lot during test (90 days)	"	756	695	729
Average daily gain	"	1·20	1·10	1·16
Hay consumed, at $12 per ton	"	677	677	677
Oat chop consumed, at 2·3 cents per pound	"	1,534	2,042	1,534
Barley chop consumed, at 1·2 cents per pound	"	.....	.....	568
Bran consumed, at 1·9 cents per pound	"	260	260	260
Frozen wheat consumed, at 1·2 cents per pound	"	568	.....	.....
Tankage consumed, at 2·8 cents per pound	"	130	130	130
Oilcake meal consumed, at 3·5 cents per pound	"	130	130	130
Mineral mixture consumed, at 72 cents per cwt	"	220	220	220
Total quantity of meal consumed	"	2,622	2,562	2,622
Meal required per 100 pounds gain	"	347	369	360
Total cost of feed	$	69 86	65 74	60 87
Cost of feed per 100 pounds gain	$	8 05	9 46	8 35
Returns per head at $10 per cwt. less cost of all feed	$	7 66	6 09	7 35

The frozen wheat lot made the greatest gains and required less feed per 100 pounds gain. The oat chop alone seems inadequate to produce the most economical gains even in winter.

Shade for hogs helps to prevent scalding.

SUMMER FEEDING EXPERIMENTS

Oat and Barley Chop vs Oat Chop and Shorts

For a period of 124 days during the summer, 20 spring pigs were fed in equal groups to compare the relative value of barley and shorts when combined with oats for growing pigs. The pigs had access to green oat pasture, but no charge has been made for pasture in reporting the experiment.

TABLE 7—BARLEY VS. SHORTS, FED WITH OAT CHOP

		Lot 1	Lot 2
		Oats and barley	Oats and shorts
Number of pigs in each lot		10	10
Initial gross weight of lot	lb.	470	463
Initial average weight	"	47·0	46·3
Final gross weight of lot	"	2,013	1,966
Final average weight	"	201·3	196·6
Total gain per lot during test (124 days)	"	1,543	1,503
Average gain per pig	"	154·3	150·3
Average daily gain	"	1·24	1·21
Oat chop consumed, at 2·3 cents per pound	"	3,525	3,525
Barley chop consumed, at 1·2 cents per pound	"	1,946	.....
Shorts consumed, at 1·9 cents per pound	"	.....	1,946
Tankage consumed, at 2·8 cents per pound	"	304	304
Oilcake meal consumed, at 3·5 cents per pound	"	304	304
Mineral mixture consumed, at 72 cents per cwt.	"	42	40
Total quantity of meal consumed	"	6,079	6,079
Meal required per 100 pounds gain	"	394	404
Total cost of feed	$	123 88	137 49
Cost of feed per 100 pounds gain	$	8 03	9 15
Returns per head at $10.75 per cwt., less cost of all feed	$	9 25	7 39

Slightly greater gains resulted from the use of barley, but the chief cause for the difference in returns is the higher price of shorts by 70 cents per cwt. In a previous test, shorts gave higher returns than barley, even at 45 cents per hundred higher price. In any case, it appears that when barley is not easily obtained, shorts would make a satisfactory substitute if the price is not over 50 to 75 cents per cwt. higher.

MILK POWDER VS. TANKAGE

In comparing milk powder and tankage as protein supplements, the quantities fed were according to the protein content, the milk powder being 36 per cent and the tankage 50 per cent.

TABLE 8—MILK POWDER VS. TANKAGE

—		Lot 1	Lot 2
		Milk powder	Tankage
Number of pigs in each lot		10	10
Initial gross weight of lot	lb.	472	470
Initial average weight	"	47·2	47·0
Final gross weight of lot	"	1,937	2,013
Final average weight	"	193·7	201·3
Total gain per lot during test (124 days)	"	1,465	1,543
Average gain per pig	"	146·5	154·3
Average daily gain	"	1·18	1·24
Oat chop consumed, at 2·3 cents per pound	"	3,525	3,525
Barley chop consumed, at 1·2 cents per pound	"	1,946	1,946
Milk powder consumed, at 7·8 cents per pound	"	411	.....
Tankage consumed, at 2·8 cents per pound	"	.....	304
Oilcake meal consumed, at 3·5 cents per pound	"	304	304
Mineral mixture consumed, at 72 cents per cwt	"	64	42
Total quantity of meal consumed	"	6,250	6,121
Meal required per 100 pounds gain	"	427	397
Total cost of feed	$	147 57	123 88
Cost of feed per 100 pounds gain	$	10 07	8 03
Returns per head at $10.75 per cwt. less cost of all feed	$	6 07	9 25

Tankage produced greater returns, although the total protein intake was the same, and on account of the higher price of the milk powder the net returns over feed were further reduced in lot 1.

This experiment indicates that milk powder would not be a suitable substitute for tankage unless it could be purchased at a lower price than tankage. This is the third test made at this Station comparing these two supplements and the tankage has given greater returns in every case.

Oats and Barley Chop vs. Each Alone

Three lots of ten pigs each were used to determine the value of barley and oats each fed as the only grain, but both supplemented by 5 per cent tankage, 5 per cent oilcake meal and the mineral mixture previously mentioned was kept before the pigs in a separate trough. Oat pasture was provided for all lots.

TABLE 9—OATS AND BARLEY VS. EACH ALONE

—		Oats and barley	Barley only	Oats only
Number of pigs in each lot		10	10	10
Initial gross weight of lot	lb.	470	472	463
Initial average weight	"	47·0	47·2	46·3
Final gross weight of lot	"	2,013	2,070	1,931
Final average weight	"	201·3	207·0	193·1
Total gain per lot during test (124 days)	"	1,543	1,598	1,468
Average gain per pig	"	154·3	159·8	146·8
Average daily gain	"	1·24	1·29	1·18
Oat chop consumed, at 2·3 cents per pound	"	3,525	.....	5,471
Barley chop consumed, at 1·2 cents per pound	"	1,946	5,471	.....
Tankage consumed, at 2·8 cents per pound	"	304	304	304
Oilcake meal consumed, at 3·5 cents per pound	"	304	304	304
Mineral mixture consumed, at 72 cents per cwt	"	42	38	42
Total quantity of meal consumed	"	6,079	6,079	6,079
Meal required per 100 pounds gain	"	394	380	414
Total cost of feed	$	123 88	85 07	145 28
Cost of feed per 100 pounds gain	$	8 03	5 32	9 90
Return per head at $10.75 per cwt. less cost of all feed	$	9 25	13 75	6 23

In a previous test, barley alone resulted in a greater net return than a mixture of oats and barley, and previous tests including the feeding of oats alone, have shown oats to be rather unsatisfactory as the only grain. This test is in accordance with those made previously. Barley alone has given the greatest gains and although some consider it too strong a feed for winter conditions, it seems entirely satisfactory for summer feeding when the hogs are on pasture. The lot getting straight oats showed a decided lack of finish.

QUALITY OF PORK

In order to determine any important differences in quality of pork produced by these feeds, fat samples were taken and the refractive indices were obtained for all. The refractive index is the deflection of polarized light as it passes through the two surfaces of solid or liquid and gives a close measure of the amount of unsaturated fatty acids. It furnishes a satisfactory means of comparing and showing slight changes in the degree of firmness which are not shown well by hand grading, although it often agrees very closely with the physical grades. A figure of 1·4599 or below, indicates firm pork, but 1·4600 or higher, indicates softness in fat and consequently a lower quality of pork. A few fat samples were taken from each of five lots and the only indication of softness was in the oat lot where two samples gave a figure above 1·4600, indicating again that oats should be combined with some other grain when fed to market hogs.

REFRACTIVE INDICES OF PORK FAT AT 40° CENTIGRADE

Barley	Oats	Shorts	Milk powder	Oats and barley
1·4587	1·4604	1·4595	1·4595	1·4595
1·4594	1·4604	1·4596	1·4590	1·4585
1·4587	1·4595	1·4597	.....	1·4590

CO-OPERATIVE WORK IN ADVANCED REGISTRATION OF SWINE

This Station again co-operated with the Dominion Live Stock Branch in the advanced registration of swine. Six sows were entered all of which weaned the required eight pigs or over, and the four pigs selected for slaughter test in every case reached the 200 pounds before the required 200 days from birth. The reports of the slaughter test have not been received at the time of preparing this report (December 1). The following tables show some details of the breeding, feeding and gains:—

COST PRICES OF FEED USED

Oats—55 cents per bushel
Feed flour—$1.80 per hundred
Tankage—$2.80 per hundred.
Oilcake—$3.50 per hundred.
Barley—57 cents per bushel.
Bran—$1.95 per hundred.
Shorts—$1.95 per hundred.

TABLE 10—RECORDS ON SWINE ENTERED UNDER ADVANCED REGISTRATION POLICY

DOMINION EXPERIMENTAL FARMS

Tag number of dam	Name and number of sow	Sire of litter and number	Litter data				Weights of 5 feeder pigs							Feed consumption of sow and litter—farrowing to weaning	
			Number born	Number weaned	Weight of litter										
					Birth	Weaning	Weaning	30 days	60 days	90 days	120 days	Finish	Total gain	Meal	Milk
					lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.		lb.	lb.
91B	Scott Augustine 10—140254	Fairview Masterpiece–139644	8	7	26	109	89½	223	375	601	802	1,071	981½	540	.....
53B	Scott Belle 73–140250	Fairview Masterpiece–139644	9	8	32	161	111	271	472	672	903	1,047	936	368	.....
4	Scott Belle 45–129916	Count 161F–134831	11	8	34	146	131	249	576	687	913	1,055	924	480	193
129B	Scott Belle 81–140258	Fairview Masterpiece–139644	9	8	28	166	121	214	423	616	853	1,049	928	644	673
10	Scott Belle 41–129912	Count 161F–134831	17	9	39	259	164	311	559	792	940	1,052	888	1,074	757
3	Scott Augustine 4–110887	Count 161F–134831	12	8	37	236	152	284	492	710	945	1,043	891	1,019	673

TABLE 11—FEED CONSUMPTION—FIVE PIGS, WEANING TO MARKETING

Tag number of dam	1st 30 days			2nd 30 days			3rd 30 days			4th 30 days			5th 30 days			Total		
	Meal	Milk	Other feeds	Meal	Milk	Other feeds	Meal	Milk	Other feeds	Meal	Milk	Other feeds	Meal	Milk	Other feeds	Meal	Milk	Other feeds
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
91B	154	260	5	415	530	12	568	710	10	1,052	1,120	18	914	1,000	19	3,103	3,620	64
53B	152	260	6	388	530	11	676	710	10	1,051	1,120	16	649	680	19	2,916	3,300	62
4	140	240	4	621	760	10	698	640	12	854	960	14	568	680	20	2,881	3,280	60
129B	199	320	7	349	640	11	747	1,120	11	874	1,000	17	952	300	17	3,121	3,380	63
10	252	340	5	449	580	12	864	1,120	13	1,136	1,240	13	98	120	21	2,799	3,400	64
3	252	320	4	449	580	11	864	1,120	11	952	1,000	15	424	220	29	2,941	3,240	70

TABLE 12—MEAL MIXTURES—PERCENTAGE, COMPOSITION AND COST PER 100

Feeds used	Farrowing to weaning	Five feeder pigs		
		First 60 days	60 to 90 days	90 days to finish
	%	%	%	%
Oat chop	45	30	40	25
Feed flour	10	30	.....	.....
Tankage	5	5	5	5
Oilcake meal	5	5	5	5
Barley chop	15	15	25	50
Bran	10	5	.....	.....
Shorts	10	10	25	15
Cost of meal mixture per 100	$2 13	$2 14	$2 02	$1 79
Other feeds used and valuation— Buttermilk, at 40 cents per 100	50 pounds	170 pounds	200 pounds	220 pounds

383 pounds of minerals at 72 cents per 100.

NOTE.—Percentages of feeds from farrowing to weaning, include feed given to pigs in creep before weaning.

TABLE 13—COST AND RATES OF GAIN (5 PIGS)

Tag numbers of dams	91B	53B	4	129B	10	3
Total gain after weaning..... lb.	982	936	924	928	888	891
Total meal eaten per lot after weaning..... "	3,103	2,916	2,881	3,121	2,799	2,941
Meal required per 100 pounds gain.. "	316	312	312	336	315	330
Average age in days to reach market weight..... days	198	185	172	195	180	184
Cost of feed per 100 pounds gain... $	7 78	7 63	7 64	8 17	7 82	8 05

Advanced registration of swine is to the swine breeder what the Record of Performance test is to the dairyman. In addition to having a pure bred animal the ancestry of which may be traced, the performance of the dams will be available. For a dam to qualify for Advanced Registration, she is required to wean at least eight pigs and have at least four fed to market weights, which must reach 200 pounds in 200 days from birth, then comply with specific measurements of carcass after being slaughtered.

23525—3½

FIELD HUSBANDRY

CROP ROTATIONS

With extremely low grain prices in the fall of 1930, high yields were necessary to produce profits. Using a cropping system of summer-fallow, wheat, wheat and oats, it would require yields of 30, 25 and 65 bushels per acre respectively for a farmer to break even. These figures were arrived at after an analysis of nine rotations involving 191 acres at this Station. Farm wages at forty dollars a month or twenty-five cents an hour with thirty-five cents an hour for stooking and six cents an hour for horse labour were used in calculating these figures. For other detailed cost and return values the reader is referred to the table given below.

TABLE 14—COST AND RETURN VALUES, 1930

Field work	Number of horses	Size of implement	Acres per day	Cost per acre
				$
Cultivating	6	9-foot	14·0	0 44
Cultivating	2		10·0	0 37
Cutting grain	4	8-foot	15·0	0 39
Cutting hay	2	5-foot	10·0	0 37
Disking	6	8-foot	14·0	0 44
Harrowing	6	24-foot	52·0	0 12
Packing	6	15-foot	29·0	0 21
Ploughing—sod	5	Two fourteen-inch	3·96	1 39
Ploughing—stubble	5	Two fourteen-inch	4·81	1 14
Raking hay	2	8-foot	20·0	0 19
Scuffling	1		4·5	0 69
Seeding	4	10-foot	20·6	0 24
Cutting sunflowers	2		4·5	1 04

Cost Values

Ensiling sunflowers	per ton	$1 00
Machinery	per acre	1 35
Manure	per ton	1 00
Rent	per acre	2 40
Seed barley	per bushel	0 60
Seed oats	per bushel	0 60
Seed rye	per bushel	0 70
Seed wheat	per bushel	1 25
Sunflower seed	per pound	0 11
Sweet clover seed	per pound	0 16
Western rye grass seed	per pound	0 12
Stacking hay	per ton	1 25
Stooking	per acre	0 40
Threshing wheat	per bushel	0 10
Threshing oats	per bushel	0 06
Threshing barley	per bushel	0 08
Threshing western rye grass	per bushel	0 11
Threshing rye	per bushel	0 10
Twine	per pound	0 14½

Return Values

Wheat, No. 1 Northern	per bushel	$0 53
Barley, 3 C.W.	per bushel	0 12
Oats, 2 C.W.	per bushel	0 18
Barley straw	per ton	1 50
Oat straw	per ton	1 50
Pasture—cow	per month	0 75
Pasture—horse	per month	1 25
Pasture—sheep	per month	0 30
Rye	per bushel	0 20
Sunflower silage	per ton	3 50
Western rye grass hay	per ton	9 00
Sweet clover hay	per ton	10 00

In arriving at the cost per acre figures for the different implements, horse and manual labour were calculated at the rates quoted above for a ten-hour day. This amount was then divided by the acres per day in order to give the cost per acre. For example, in cutting hay two horses were used at six cents an hour each for ten hours. This makes $1.20. The manual labour would cost $2.50. The total of $3.70 divided by ten acres cut per day gives a cost of thirty-seven cents per acre for cutting hay. Other cost per acre figures for other operations were calculated in the same way except that thirty-five cents was the rate paid for manual labour in harvest time. Records over a period of years have served as a basis for the acres covered by the different implements.

From the above paragraph it might be assumed that cost and depreciation of farm implements have not been taken into consideration. An examination of the cost values will show that a flat charge of $1.35 per acre has been made. Seed and twine were charged at their actual cost and threshing at the prevailing rates.

Return values represent the existing values. Grain prices were determined by the average price paid at this point for the months of September and October. Hay appears to have a relatively higher value, but nevertheless, it represents the existing price for this season.

Having determined the cost and return values, these should be applied to the cropping system used in order to determine the profit. In this report, these have been used on nine different rotations or cropping systems for this purpose. These follow.

TWO-YEAR ROTATION

Summer-fallow.
Wheat.

TABLE 15—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average ten years			1930	Average ten years
	bush.	bush.	$	$	$	$
Summer-fallow	.....	.....	.....	.....	.....	.....
Wheat	31·3	23·9	16 59	17 61	−1 02	3 62
Average per acre	.....	.....	8 30	8 81	−0 51	1 81

In 1930 the rotation consisting of alternate wheat and summer-fallow produced a net loss of fifty-one cents per acre. Summer-fallow cost amounted to slightly in excess of seven dollars per acre. Although the wheat yield was good, it was not profitable because it had to absorb all the summer-fallow cost. This applies also to the ten-year average profit when compared with the other rotations in this report. For this reason advocates of this rotation deceive themselves by considering they have a good crop on half their land and not making allowance for the summer-fallow cost on the other half. In dry years, such as 1922 and 1924, this cropping system gave more profit than a three-year rotation consisting of summer-fallow and two grain crops. Its use should logically be confined to dry areas. Because of its low profits and increasing weeds, it cannot be recommended as a general farm practice.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Wheat.

TABLE 16—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average nineteen years			1930	Average nineteen years
	bush.	bush.	$	$	$	$
Summer-fallow						
Wheat	20·8	18·7	11 02	13 67	−2 65	4 65
Wheat	22·0	17·1	11 66	12 64	−0 98	3 65
Average per acre			7 56	8 77	−1 21	2 77

No rotation is so well known among prairie farmers as two grain crops and summer-fallow. It is usually the standard by which others are measured.

It will be observed that the yield on stubble for 1930 is higher than that on fallow. This has been the case nine out of nineteen years. The average of both for the first nine years was three bushels in favour of fallow, but for the last nine it was half a bushel in favour of stubble. This stubble was always spring ploughed. Weeds offer the explanation.

Added usefulness for the farm truck.

Of late years weeds have been increasing in the fallow crop but remaining quite constant on stubble. In 1930 there were 498 wild buckwheat and 164 lamb's quarters per square yard in the fallow crop with traces of five other weeds. This means over twice as many weeds as wheat plants. In the stubble crop, the average number of weed seeds per square yard were wild buckwheat

8·8, Frenchwood 1·4, Blueburr 4·4, Pepper grass 3·2, Lamb's quarters 0·2, and Tansy mustard 0·4. These figures help explain why the stubble wheat crop is frequently better than that on fallow.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Fall rye.

TABLE 17—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average seven years			1930	Average seven years
	bush.	bush.	$	$	$	$
Summer-fallow						
Wheat	35·1	22·9	18 60	15 66	2 94	5 58
Fall rye	12·2	17·2	2 44	9 84	−7 40	0 09
Average per acre			7 01	8 50	−1 49	1 89

Few farmers are attracted by this rotation in the field or from the profits obtained. It would appear that their conclusion is justified.

Yield of rye has averaged about the same as the second crop of wheat in the rotation previously discussed. On the average, rye is lower in price and consequently the profits are lower. A heavy stand of fall rye smothers annual weeds. It frequently happens that soil is dry in the fall, resulting in a poor stand of rye when weeds multiply rapidly the following season. Weeds are increasing in this rotation and the market value of the wheat crop is lowered by volunteer fall rye.

The profits are no higher with only one ploughing in three years, keeping in mind that ploughing is the most expensive tillage operation. Disking of wheat stubble and seeding the fall rye come at a time when work is heaviest. Consequently the working of this rotation does not blend with prairie agriculture.

THREE-YEAR ROTATION

Summer-fallow.
Wheat.
Sweet clover.

TABLE 18—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average nine years			1930	Average nine years
	bush.	bush.	$	$	$	$
Summer-fallow						
Wheat	32·6 tons	21·6 tons	17 28	14 70	2 58	4 84
Sweet clover	0·00	8-yrs. 1·32		8 41	−8 41	0 05
Average per acre			5 76	7 70	−1 94	1 63

The first observation to be made in the table covering the above rotation, is that there was no yield of sweet clover in 1930. In nine years sweet clover has failed twice. Failure of this crop has reduced profits and allowed weeds to take possession with added expense for their destruction. In six out of nine years there has been a good crop of sweet clover. In the light of the above facts and figures, this rotation consisting of summer-fallow, wheat and sweet clover, cannot be considered a practical rotation in this district.

Three-year Rotation

Summer-fallow.
Wheat.
Oats.

Table 19—Summary of Yields, Value and Profit and Loss per Acre

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average nine years			1930	Average nine years
	bush.	bush.	$	$	$	$
Summer-fallow	.....	.....	.....	.....	.....	.....
Wheat	27·4	23·0	14 52	14 92	−0 40	5 72
Oats	53 1	49·1	11 14	13 46	−2 32	5 02
Average for rotation	.....	.....	8 55	9 46	−0 91	3 58

Summer-fallow, wheat and oats is a prairie rotation which has some merit. The land is cleaner than where a similar rotation is used containing two crops of wheat. Oats, as a second crop after summer-fallow, are sown later than wheat and occupy the land for less time. This rotation, in comparison with the one mentioned, has less weeds but a similar number of varieties.

From a standpoint of profit, this rotation compares favourably with those already discussed. There is only seventy cents per acre difference in profit between oats on spring ploughing and wheat on summer-fallow. For nine years, under this cropping system, the average cost of producing a bushel of grain has been eighty-five cents for wheat and forty-five cents for oats. This grain rotation is used with slight modifications in general farm practice.

Four-year Rotation

Summer-fallow.
Wheat.
Oats.
Sweet clover.

Table 20—Summary of Yields, Value and Profit and Loss per Acre

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	193	Average five years			1930	Average five years
	bush.	bush.	$	$	$	$
Summer-fallow	.....	.....	.....	.....	.....	.....
Wheat	30·4	28·6	16 11	14 91	1 20	11 38
Oats	47·8	40·7	10 01	12 43	−2 42	5 12
	tons	tons				
Sweet clover	0 78	0 89	9 79	8 53	1 26	2 03
Average per acre	.....	.....	8 98	8 97	0 01	4 63

Because of its performance in the past five years, this rotation is attracting considerable attention, and judging by its probable future, it will be popular in Northwestern Saskatchewan particularly among keepers of live stock.

So far, its cleanliness is an outstanding feature. There has been a good catch of sweet clover every year. Sweet clover is sown in the drill mixed with oats at the rate of one bushel of oats to fifteen pounds of sweet clover.

From a standpoint of profits, this rotation is one of the highest on the Station. In 1929, a year of drought, it produced a net profit of $2.18 per acre while all others operated at losses ranging from fifteen cents to $3.37. Again in 1930, when extremely low grain prices prevailed, it was the only rotation on the Station which had no loss. Average costs per bushel of sixty-four cents for wheat and thirty-eight cents for oats are also figures unexcelled in the other rotations, except in one case for oats.

Any explanations for this good performance would need to be qualified in many ways. For the five years under trial the figures for this rotation speak for themselves.

FOUR-YEAR ROTATION

Intertilled wheat.
Wheat.
Oats.
Sweet clover.

TABLE 21—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average five years			1930	Average five years
	bush.	bush.	$	$	$	$
Intertilled wheat	11·1	14·8	5 88	9 28	−3 40	4 85
Wheat	24·9	21·9	13 20	10 28	2 92	9 32
Oats	41·6	38·6	8 72	11 03	−2 31	6 57
	tons	tons				
Sweet clover	0·78	0·74	9 79	8 53	1 26	0 74
Average per acre			9 40	9 78	−0 38	5 37

This rotation is similar to the one previously discussed except that wheat in rows has been used as a summer-fallow substitute. This is a feature which needs special mention.

Although grain in rows shows an average profit, it was produced at a loss for the past two seasons. This is not necessarily a gradual decrease in yield and profit, but is caused by drought and low prices for the past two years respectively. Fourteen kinds of weeds, which are more than on any other field on the Station, were well distributed among the rows in 1930. Naturally this had a tremendous influence on weed distribution in the succeeding crops. Rapid increase of weeds has been responsible for its discontinuance after trial among farmers in this district.

Profit on the rotation is outstanding on the average for five years, but it has lost money the past two seasons. More years of testing are required to determine the usefulness of this rotation.

SIX-YEAR ROTATION

Summer-fallow.
Wheat.
Wheat.
Oats.
Hay or pasture.
Hay or pasture.

TABLE 22—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop 1930	Cost of production 1930	Profit or loss per acre	
	1930	Average nineteen years			1930	Average nineteen years
	bush.	bush.	$	$	$	$
Summer-fallow						
Wheat	21·5	23·8	11 40	14 17	−2 77	10 04
Wheat	21·8	19·5	11 55	11 94	−0 39	3 94
Oats	48·9	46·6	9 24	10 72	−1 48	7 36
	tons	tons 15-yrs.				
Hay or pasture	0·40	0·89	4 76	6 61	−1 85	1 51
	tons					
Hay or pasture	1·10	.....	9 90	6 93	2 97	1 79
Average per acre	.....	.....	7 81	8 40	−0 59	4 11

This six-year rotation has had a comparatively long test at this Station and during the past ten years has been gaining popularity as a farm practice in Northwestern Saskatchewan. Six twenty-acre fields have been used to test it experimentally and most farmers using it have adopted a fifty-acre unit.

With wheat fields averaging almost 24 and 20 bushels per acre over a period of nineteen years, it is about 4 bushels per acre above the average of a straight grain rotation over the same period. Oats averaging practically 47 bushels per acre have set a high standard in this area for third crop after summer-fallow. Hay has been used for hay or pasture as required. Such a combination with modifications to meet specific requirements, provides a balanced mixed farming rotation.

Spring ploughing has been used for second wheat crop and also for oats. After ploughing, the land was packed and harrowed. Oats were seeded down with a mixture of 10 pounds of Western rye grass and 8 pounds of sweet clover per acre. These proportions were mixed with the amount of oats seeded per acre and all placed in the drill box. Rate of seeding oats was increased three pecks to sow the whole mixture at the required rates per acre.

General observation in the growing months shows the rotation to be comparatively clean. When dry seasons resulted in a poor stand of grass, weeds crept in these fields. Weeds not found on the Station in straight grain rotations, have been found in these fields, and apparently have been introduced with grass and clover seed. Greater care must be exercised in selecting pure stocks of these seeds. A weed survey in 1930 showed eighteen different kinds of weeds for all fields, but compared with grain rotations, the number per unit was relatively small.

Over a period of years the profit has been well maintained, but the past two years have served to lower the general average. However, its standing will be better understood by comparing it with a straight grain rotation shown in the next table.

TABLE 23—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
	$	bush.	$	$	bush.	$
18 yrs. (1913–1930)	6 87	18·5	2 74	6 45	23·3	3 75
9 yrs. (1913–1921)	5 83	20·8	5 38	6 54	24·8	4 48
9 yrs. (1922–1930)	7 90	16·1	0 10	6 35	21·9	3 01

The above comparison of two different types of rotations is worthy of study to compare summer-fallow costs, yields of fallow wheat and rotation profits.

Cost of summer-fallow on the straight grain rotation has increased, while in the mixed rotation this cost has remained stationary. This has been due to increasing weeds in the grain rotation, making necessary more tillage operations for their eradication. Numbers of weeds have been mentioned in discussing these individual rotations.

A higher average of approximately five bushels of wheat is shown in favour of the mixed rotation for the eighteen-year period. A decrease of approximately five bushels is recorded in the grain rotation for the second nine-year period while only three bushels is indicated for the mixed rotation in the same period. The fallow wheat in the grain rotation is four to five bushels less than the mixed rotation for the periods compared.

A rotation is best measured by its profits both in dollars and fertility. In the first nine years the grain rotation had the higher net profit. During the next nine years its profit was practically wiped out while that of the mixed rotation, during the same period, has been fairly well maintained.

EIGHT-YEAR ROTATION

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

TABLE 24—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Crop	Yield per acre		Value of crop	Cost of production	Profit or loss per acre	
	1930	Average nineteen years	1930	1930	1930	Average nineteen years
	bush.	bush.	$	$	$	$
Summer-fallow						
Wheat	24·7	22·1	13 00	16 97	−3 88	5 62
Wheat	33·3	17·6	17 65	16 23	1 42	2 31
Summer-fallow						
	tons	tons 11 yrs.				
Sunflowers	5·78	9·10	20 23	23 12	−2 89	3 74
	bush.	18 yrs.				
Barley	42·7	28·5	6 88	15 20	−8 32	0 25
		tons 18 yrs.				
Hay or pasture		1·15		7 33	−7 33	2 40
		tons 15 yrs.				
Hay or pasture		1·02		7 33	−7 33	1 24
Average per acre			7 23	10 77	−3 54	1 94

At this Station the above eight-year rotation has not demonstrated its practical usefulness. In nine years out of nineteen it has operated at a loss. A straight grain rotation for the same period has given a greater profit. Its length is against it for general use. The application of manure has not materially influenced yields. Of the nine rotations discussed, this had the greatest loss per acre in 1930.

COST OF PRODUCING WHEAT AND OATS, 1930

Particularly in years of low grain prices or low yields, cost of producing grain crops, especially wheat, is a much discussed topic in the prairie provinces. Based on farm wages and grain prices in 1930, some figures have been prepared to show the relation of yield to cost per bushel. Cost and return values as outlined in the field husbandry section of this report, have been used in arriving at these figures.

No matter what yield is obtained, there are a number of fixed costs. These include rent, interest and depreciation on equipment, seed and tillage operations. There is a slight variation for the particular crop and the share of summer-fallow to be charged against the crop must also be taken into consideration. The average cost of summer-fallow for 1930 amounted to $6.78. This amount has been charged in the proportion of two-thirds to the first crop after summer-fallow and one-third to the second crop after summer-fallow. It will be noted that ploughing has been used for stubble crops, but if disking or cultivating is substituted, the cost would be less. In order to explain fixed costs more clearly a table is presented.

TABLE 25—FIXED COSTS PER ACRE FOR WHEAT AND OATS, 1930

Item of cost	Wheat on fallow	Second crop wheat	Second crop oats	Third crop oats
	$	$	$	$
Rent	2 40	2 40	2 40	2 40
Machinery	1 35	1 35	1 35	1 35
Seed	1 56	1 25	1 20	1 20
Seeding	0 24	0 24	0 24	0 24
Cultivating	0 44	.....	.....	.....
Harrowing	0 24	0 24	0 24	0 24
Cutting	0 39	0 39	0 39	0 39
Stooking	0 40	0 40	0 40	0 40
Share of fallow	4 52	2 26	2 26	.....
Ploughing	.....	1 14	1 14	1 14
Packing	.....	0 21	0 21	0 21
Total	11 54	9 88	9 83	7 57

Some criticism may be offered for the fixed charge of forty cents per acre for stooking. In actual practice this year, when there was a good quantity of straw for all yields, the figure was close to this amount.

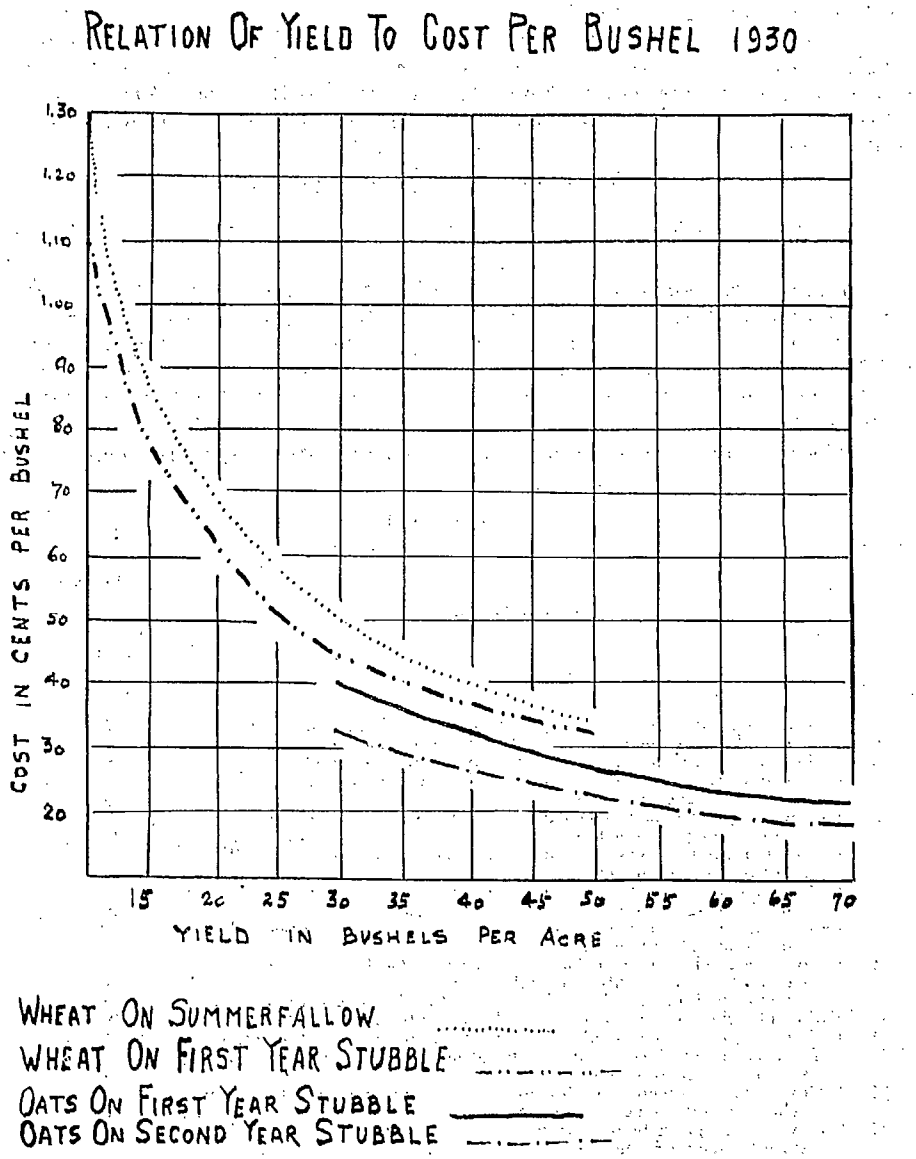
There are two costs which vary with the yield. These are twine and threshing. Fixed and variable costs are included in a table with yields from ten to fifty bushels of wheat on summer-fallow to show the relation of yield to cost per bushel.

TABLE 26—COST OF PRODUCING WHEAT ON SUMMER-FALLOW

Fixed costs per acre	Cost twine per acre	Cost of threshing per acre	Total charge against crop per acre	Yield per acre	Cost per bushel
$	$	$	$	bush.	$
11 54	0 15	1 00	12 69	10	1 27
11 54	0 22	1 50	13 26	15	0 88
11 54	0 30	2 00	13 84	20	0 69
11 54	0 37	2 50	14 41	25	0 58
11 54	0 44	3 00	14 98	30	0 50
11 54	0 51	3 50	15 55	35	0 44
11 54	0 58	4 00	16 12	40	0 40
11 54	0 58	4 50	16 62	45	0 37
11 54	0 58	5 00	17 12	50	0 34

The important fact brought out by the above table is that cost per bushel of wheat on summer-fallow varies inversely with the yield. It should be remembered that it is a net cost, which means that due allowance has been made for all items including manual labour with board.

In order that the reader may visualize the relation of yield to cost per bushel for both wheat and oats, a graph is presented showing that cost per bushel decreases with increased yield.



CULTURAL EXPERIMENTS

Cultural practices is the name given to all phases of crop production inclusive of work with varieties. These include rates of seeding, dates of seeding, tillage operations, manures and fertilizers. Such experiments should determine what field practices are best suited for a given area. A number of cultural experiments have been tried for a number of years and results reported, but fourteen were in progress during 1930. It is proposed to conclude some of the present experiments and introduce some new work by enlarging on some phases which are proving beneficial.

The general procedure in these tests was similar in certain factors. All work was conducted in one-fortieth acre plots. Borders and ends of grain plots were removed before harvesting. One variety was used in this work with each class of grain and in each experiment was seeded the same day except where dates applied.

METHODS OF SUMMER-FALLOWING

OBJECT OF EXPERIMENT.—To test certain methods of handling summer-fallow.

PLAN OF EXPERIMENT.—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 the same depth but given different treatments previous to summer-fallow.

The rotation used is summer-fallow, wheat, oats on spring-ploughed stubble.

TABLE 27—SUMMER-FALLOW TREATMENT

(Project No. F 144)

Plot No.	Plot treatment	Average yield per acre	
		Wheat 15 years	Oats 16 years
		bush.	bush.
1	Fallow ploughed 4 inches in June. Wheat stubble ploughed 6 inches	27·3	60·4
2	Fallow ploughed 6 inches in June. Wheat stubble ploughed 6 inches	27·3	56·6
3	Fallow ploughed 8 inches in June. Wheat stubble ploughed 6 inches	26·8	57·3
4	Fallow ploughed 4 inches in June and 4 inches in September. Wheat stubble ploughed 6 inches	26·8	56·4
5	Fallow ploughed 6 inches in June and 6 inches in September. Wheat stubble ploughed 6 inches	26·1	55·9
6	Fallow ploughed 8 inches in June and 8 inches in September. Wheat stubble ploughed 6 inches	25·9	56·1
7	Fallow ploughed 6 inches in June and 4 inches in September. Wheat stubble ploughed 6 inches	28·1	55·9
8	Fallow ploughed 4 inches in June and 6 inches in September. Wheat stubble ploughed 6 inches	30·5	55·0
10	Fallow ploughed 5 inches in June, seeded with ½ bushel oats per acre and pastured. Wheat stubble ploughed 6 inches	24·9	51·8
11	Fallow ploughed 6 inches May 15. Wheat stubble ploughed 6 inches	30·7	56·5
12	Fallow ploughed 6 inches June 15. Wheat stubble ploughed 6 inches	28·5	53·7
13	Fallow ploughed 6 inches July 15. Wheat stubble ploughed 6 inches	24·8	53·6
14	Cultivated in fall before summer-fallowing 6 inches in June. Wheat stubble ploughed 6 inches	26·8	53·2
15	Fallow ploughed 4 inches in fall before summer-fallowing 6 inches in June. Wheat stubble ploughed 6 inches	27·8	54·3
17	Cultivated in spring before summer-fallowing 6 inches in June. Wheat stubble ploughed 6 inches	29·1	54·1

RESULTS.—Four inches has proved more economical than six or eight inches for ploughing summer-fallow.

Where two ploughings for summer-fallow were used, four inches in June and six inches in September gave best results and was three bushels higher than a single ploughing in June.

One ploughing on May 15 proved more profitable (considering cost) than the best results from two ploughings. Late ploughing without previous cultivation reduced yields.

Ploughing in June and pasturing a light crop of oats on the summer-fallow year has reduced the yield the same as late ploughing.

Where summer-fallow land was ploughed early in June, no advantage was obtained by previous tillage operations, either in spring or fall.

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.

TABLE 28—SUMMER-FALLOW SUBSTITUTES

(Project No. F 145)

Plot treatment	Average yield per acre	
	Substitutes 9 years	Wheat 8 years
	bush.	bush.
Summer-fallow ploughed 6 inches deep in June	.....	25·9
Oats sown in 2-drill groups 36 inches apart	39·9	23·5
Oats sown in 3-drill groups 36 inches apart	46·9	23·8
Barley sown in 2-drill groups 36 inches apart	17·2	22·8
Barley sown in 3-drill groups 36 inches apart	22·4	23·3
Wheat sown in 2-drill groups 36 inches apart	13·0	23·5
Wheat sown in 3-drill groups 36 inches apart	15·7	21·6
Potatoes sown in rows 36 inches apart	165·6	25·0
	tons 8-year average	
Corn sown in rows 36 inches apart	2·62	26·0
	tons	7-year average
Sunflowers sown in rows 36 inches apart	10·22	19·8
Continuous wheat	.....	19·8

RESULTS.—Three drill rows of grain have proven more profitable as a summer-fallow substitute than two drill rows. Potatoes made a good summer-fallow substitute but are unsatisfactory for farm conditions. Corn, with its low yield, is not a satisfactory summer-fallow substitute. Sunflowers yielded well and the wheat following has been equal to continuous wheat for the same period. Considering the value of both crops, grain in rows appears the most profitable, but wheat raised in this way is usually frozen and this practice under farm conditions promotes volunteer grain and rapid weed development.

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.

TABLE 29—STUBBLE TREATMENT FOR WHEAT AND OATS

(Project No. F 146)

Plot No.	Second crop after fallow	Plot treatment	Yield per acre	
			Yield 1930	Average yield 16 years
			bush.	bush.
1	Wheat	Stubble ploughed 4 inches in fall	21·2	16·9
2	"	Stubble disked in fall	25·7	17·6
3	"	Stubble burned before disking in fall	29·7	19·5
4	"	Stubble burned before ploughing 4 inches in fall	24·9	18·0
5	"	Stubble burned in spring—seeded without further cultivation	24·2	20·6
7	"	Stubble disked at cutting time—ploughed 4 inches in spring	28·1	18·7
8	"	Stubble disked at cutting time—ploughed 4 inches in fall	22·2	17·4
10	"	Stubble ploughed 4 inches in spring	27·3	20·0
11	Oats	Stubble ploughed 4 inches in fall	70·6	48·9
12	"	Stubble ploughed 4 inches in spring	72·0	56·4
13	"	Stubble cultivated in spring—seeded at once	65·0	51·5
				7-year average
14	Wheat	Stubble cultivated shallow in fall—no further cultivation	26·9	15·7
15	"	Stubble cultivated deeply in fall—no further cultivation	26·9	18·1
16	"	Seeded in stubble in spring—no further cultivation	6·7	4·6
17	"	Stubble cultivated in spring—seeded at once	24·6	.....

Large implements lower production costs.

RESULTS.—Spring ploughing of stubble has given higher yields than fall ploughing for both wheat and oats. Burning the stubble in spring and seeding wheat without further cultivation has given a yield equal to spring ploughing. Fall working of stubble land resulted in a weedier crop than corresponding work done in the spring. Little difference was found between deep and shallow cultivation, but seeding grain on stubble without cultivating produced abundant weeds and low yields.

DEPTH OF PLOUGHING

OBJECT 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, and oats on spring-ploughed stubble.

TABLE 30—DEPTH OF PLOUGHING SUMMER-FALLOW

(Project No. F 148)

Plot No.	Plot treatment	Average yield per acre 16 years	
		Wheat	Oats
		bush.	bush.
1	Fallow ploughed 3 inches deep. Stubble 3 inches	24·2	49·8
2	Fallow ploughed 4 inches deep. Stubble 4 inches	25·6	51·5
3	Fallow ploughed 5 inches deep. Stubble 5 inches	24·9	50·5
4	Fallow ploughed 6 inches deep. Stubble 5 inches	24·4	49·8
5	Fallow ploughed 7 inches deep. Stubble 5 inches	24·6	49·4
6	Fallow ploughed 8 inches deep. Stubble 5 inches	23·9	50·4
7	Fallow ploughed 5 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches	24·8	52·4
8	Fallow ploughed 6 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches	25·2	52·1
9	Fallow ploughed 7 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches	25·1	52·9
10	Fallow ploughed 8 inches deep and subsoiled 4 inches below furrow. Stubble ploughed 5 inches	24·1	46·5

RESULTS.—Four inches has proved the most economical depth to plough summer-fallow and wheat stubble in spring for oats, when the extra cost of deeper ploughing is considered. The extra cost of subsoiling was not paid for by increased yields.

SOIL PACKING

OBJECT 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 compared with a plot which received an extra stroke of the harrow in place of packing.

TABLE 31—PACKING SUMMER-FALLOW

(Project No. F 149A)

Plot No.	Crop	Plot treatment	Yield per acre	
			Yield 1930	Average yield 8 years
			bush.	bush.
2	Wheat	Extra stroke of harrow after ploughing	36·4	26·7
3	"	Culti-packed after ploughing	36·8	28·3
4	"	Surface-packed after ploughing	36·0	28·5
5–18	"	Extra stroke of harrow in spring before seeding	38·1	29·7
6–19	"	Culti-packed in spring before seeding	40·6	29·5
7–20	"	Surface-packed in spring before seeding	38·6	30·0
8–21	"	Harrowed after seeding	38·8	29·5
9–22	"	Culti-packed after seeding	43·0	29·8
10–23	"	Surface-packed after seeding	39·8	28·9
11–24	"	Harrowed before and after seeding	38·0	28·2
12–25	"	Culti-packed before and after seeding	39·0	28·4
13–26	"	Surface-packed before and after seeding	39·6	28·6
15	"	Harrowed after ploughing and after seeding	40·8	29·2
16	"	Culti-packed after ploughing and after seeding	46·2	29·9
17	"	Surface-packed after ploughing and after seeding	43·6	29·7

RESULTS.—While slight fluctuations appear in certain seasons, over a period of eight years there has been no pronounced differences between harrowing and packing on summer-fallow.

TABLE 32.—PACKING OF SPRING PLOUGHING

(Project No. F. 149B)

Plot No.	Crop	Plot treatment	Yield per acre	
			Yield 1930	Average yield 9 years
			bush.	bush.
2–11	Wheat	Harrowed before and after seeding	29·5	22·2
3–12	"	Culti-packed before and after seeding	33·3	24·5
4–13	"	Surface-packed before and after seeding	30·1	22·5
5	"	Harrowed before seeding	30·5	23·3
6	"	Culti-packed before seeding	35·2	23·9
7	"	Surface-packed before seeding	33·3	24·4
8	"	Harrowed after seeding	28·5	22·9
9	"	Culti-packed after seeding	32·5	24·5
10	"	Surface-packed after seeding	31·7	23·1

RESULTS.—No advantage in yield has been obtained by packing or harrowing both before and after seeding as compared with a single operation on spring ploughing. The differences between harrowing and packing vary slightly with the season, but no significant differences are recorded over a period of years. Packing on spring ploughing has resulted in a smoother surface for harvest implements.

TABLE 33.—PACKING FALL PLOUGHING

(Project No. F 149C)

Plot No.	Crop	Plot treatment	Yield per acre	
			Yield 1930	Average yield 9 years
			bush.	bush.
15	Wheat	Harrowed after ploughing	31·3	20·2
16	"	Culti-packed after ploughing	27·7	20·9
17	"	Surface-packed after ploughing	31·7	21·5
18	"	Harrowed before seeding	28·1	22·2
19	"	Culti-packed before seeding	30·5	20·1
20	"	Surface-packed before seeding	31·7	21·4
21	"	Harrowed after seeding	30·9	20·4
22	"	Culti-packed after seeding	32·1	21·1
23	"	Surface-packed after seeding	29·3	19·0
24	"	Harrowed before and after seeding	25·7	19·1
25	"	Culti-packed before and after seeding	29·3	19·9
26	"	Surface-packed before and after seeding	28·1	19·4

RESULTS.—Harrowing versus packing for fall ploughing does not show any consistent relation between these practices and the yield of grain produced.

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 1930. Manure is applied to the second crop after fallow but tables show yields from both crops as the first crop after fallow also derives benefit from this application of manure.

TABLE 34.—MANURE FOR WHEAT—SUMMER-FALLOW, WHEAT, WHEAT

(Project No. F 189)

Plot No.	Plot treatment	Average yield 16 years		Value of crops less cost of manure
		First crop after manure on stubble	Second crop after manure on summer-fallow	
		bush.	bush.	$
1	Fresh manure in winter on first year stubble	18·9	23·2	5 16
3	Rotted manure after seeding second crop on spring ploughing	20·0	25·2	5 98
5	No manure. Spring ploughed	19·1	21·9	10 87
6	Rotted manure before ploughing first year stubble in fall	23·5	24·9	6 83
7	Rotted manure before ploughing first year stubble in spring	25·8	27·0	7 99

RESULTS.—Applying fresh manure for wheat on stubble in winter was the least profitable of any method tested. Rotted manure ploughed under, increased yields and gave best returns when ploughed under in spring for stubble crop. By charging manure at one dollar a ton it has not proved profitable to apply it.

TABLE 35.—MANURE FOR BARLEY—SUMMER-FALLOW, WHEAT, BARLEY

(Project No. F 190)

Plot No.	Plot treatment	Average yield 16 years		Value of crop less cost of manure
		Barley first crop after manure on stubble	Wheat second crop after manure on summer-fallow	
		bush.	bush.	$
1	Fresh manure in winter on first year stubble	28·5	23·3	1 89
3	Rotted manure after seeding second crop on spring ploughing	24·9	24·9	2 10
5	No manure. Spring ploughed	22·7	22·1	7 22
6	Rotted manure before ploughing first year stubble in fall	29·9	25·9	2 66
7	Rotted manure before ploughing first year stubble in spring	30·9	27·6	3 17

RESULTS.—Barley has given greater response than wheat from applications of manure with higher yields from rotted applications. In no case has applications of manure for barley produced sufficient increase in yield to pay for its cost.

TABLE 36.—MANURE FOR OATS—SUMMER-FALLOW, WHEAT, OATS

(Project No. F 191)

Plot No.	Plot treatment	Average yield 16 years		Value of crops less cost of manure
		Oats first crop after manure on stubble	Wheat second crop after manure on summer-fallow	
		bush.	bush.	$
1	Fresh manure in winter on first year stubble	55·3	26·7	6 05
3	Rotted manure after seeding second crop on spring ploughing	53·4	25·8	5 64
5	No manure. Spring ploughed	49·9	22·2	10 38
6	Rotted manure before ploughing first year stubble in fall	56·5	25·2	5 77
7	Rotted manure before ploughing first year stubble in spring	60·7	26·9	6 60

RESULTS.—The reaction of oats to manure has been similar to that of barley, but the crop returns for the rotation have been higher in all cases where oats were used.

MANURE FOR SUNFLOWERS

OBJECT OF EXPERIMENT.—To determine the amount and kind and time to apply barnyard manure for sunflowers.

PLAN OF EXPERIMENT.—Manure is applied to wheat stubble at different rates and ploughed under in fall or spring to compare with using no manure for sunflowers.

TABLE 37.—MANURE FOR SUNFLOWERS—SUMMER-FALLOW, WHEAT, SUNFLOWERS

(Project No. F 192)

Plot No.	Plot treatment	Yield per acre green weight	
		1930	Six-year average
		tons	tons
1	No manure. Spring ploughed	3·72	8·09
2	12 tons rotted manure after fall ploughing first year stubble	5·68	9·51
3	8 tons rotted manure in winter on first year stubble. Spring ploughed	6·24	9·27
4	12 tons rotted manure on first year stubble before fall ploughing	6·80	8·47
5	12 tons rotted manure in winter on first year stubble. Spring ploughed	5·72	9·51
6	12 tons fresh manure in winter on first year stubble. Spring ploughed	5·20	9·24
7	16 tons rotted manure in winter on first year stubble. Spring ploughed	5·48	9·54

RESULTS.—Influence of manure on sunflowers was slight at first but is becoming more pronounced as the experiment continues. The differences in yield from the various applications are not so pronounced as early growth appearances indicate. Further work is necessary before conclusions can be drawn covering the object of this test.

GREEN MANURE CROPS PLOUGHED UNDER

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 and oats.

TABLE 38—GREEN MANURE CROPS PLOUGHED UNDER

(Project No. F 194)

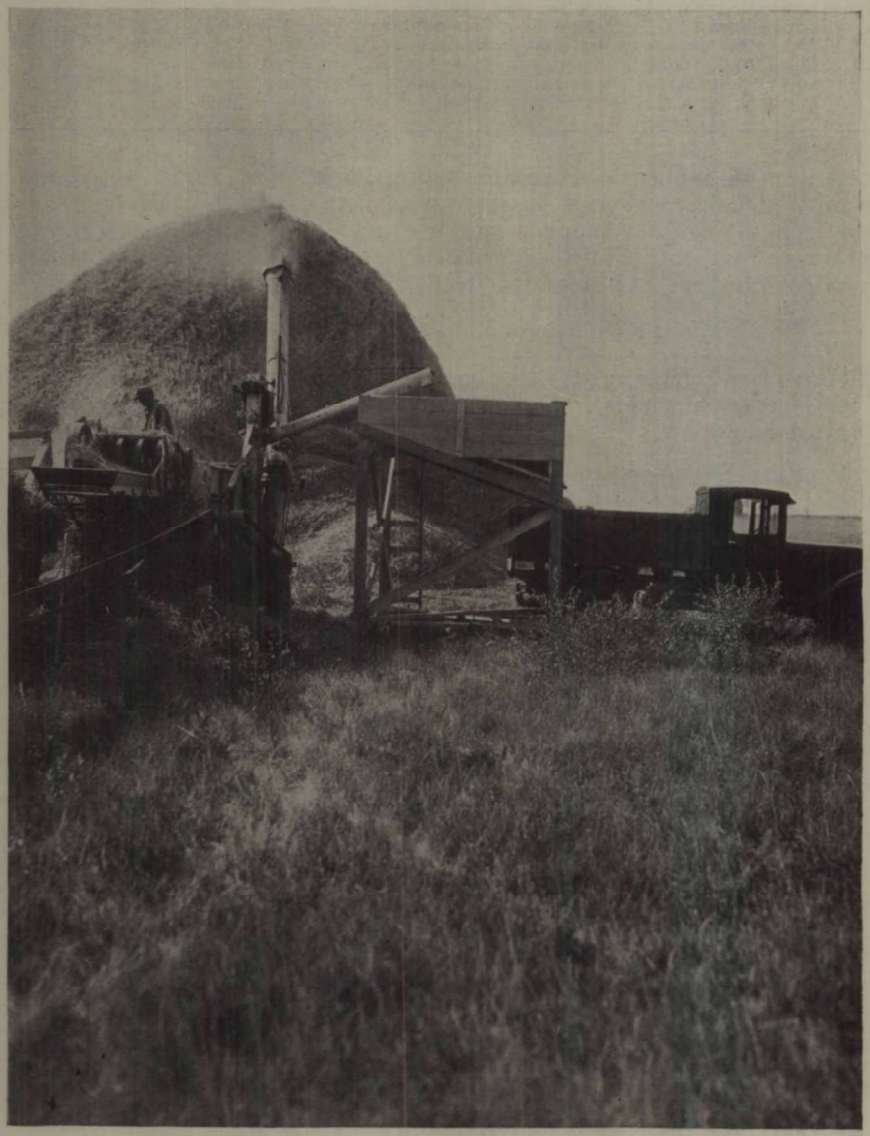
Plot No.	Plot treatment	Average yield per acre	
		Wheat 8 years	Oats 7 years
		bush.	bush.
1	Sweet clover ploughed under in July	23·4	47·5
2	Peas ploughed under in early bloom	24·4	47·5
3	Peas ploughed under in late bloom	24·2	47·0
4–6	Fallow ploughed in June—cultivated	24·2	47·9
5	12 tons barnyard manure per acre applied before summer-fallowing in June	31·5	51·8

RESULTS.—Ploughing down green manure crops in the summer-fallow of a three-year grain rotation, has not increased the yields over ordinary summer-fallow. An application of 12 tons of barnyard manure in the same rotation ploughed down with the summer-fallow, has increased the yield of wheat 7 bushels per acre and the oats 4 bushels per acre.

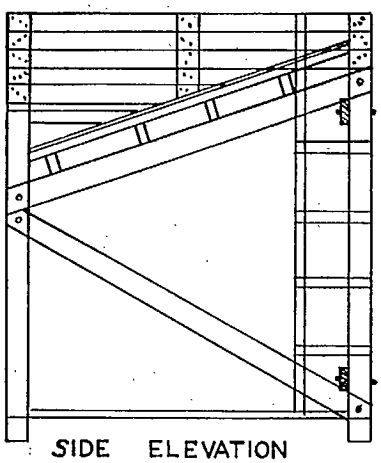
STRAW MULCH FOR WHEAT

OBJECT OF EXPERIMENT.—To determine the value of a straw mulch for wheat.

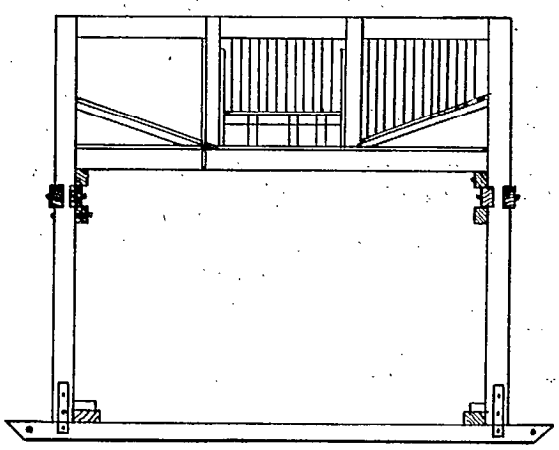
PLAN OF EXPERIMENT.—After wheat is seeded, straw is scattered on the land at the rate of 1½ tons per acre on summer-fallow and spring-ploughed stubble for wheat. Check plots are seeded and left unmulched.



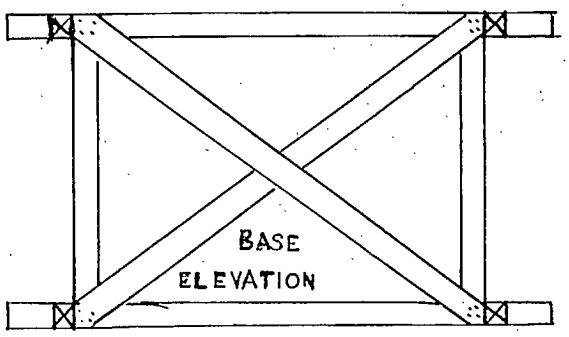
Note use of portable hopper and truck.



SIDE ELEVATION



FRONT ELEVATION



PORTABLE GRAIN HOPPER

TABLE 39—STRAW MULCH FOR WHEAT

(Project No. F 243)

Plot treatment	Average yield per acre 4 years	
	Wheat on fallow	Wheat on spring-ploughed stubble
	bush.	bush.
Straw mulch 1½ tons per acre	26·4	23·5
Check	26·1	21·4

RESULTS.—Difficulty occurs each spring in keeping straw on these plots before the grain is long enough to hold it. Volunteer grain is always observed in plots mulched with straw, but extra weeds are avoided by selecting clean material. Further years of experimenting are required to determine if the yield remains unchanged on summer-fallow and maintains its increase on stubble.

COMMERCIAL FERTILIZERS FOR FIELD CROPS

OBJECT OF EXPERIMENT.—To determine the value of commercial fertilizers 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.

TABLE 40—COMMERCIAL FERTILIZERS FOR FIELD CROPS

(Project No. F 193)

Plot No.	Crop	Kind of fertilizer applied	Rate of application per acre	Yield per acre	
				Green weight	Dry weight
			lb.	tons	tons
1	Corn	Check plot		1·58	0·23
2	"	Nitrate of soda	320	1·56	0·22
3	"	Superphosphate	600	5·08	0·70
4	"	Muriate of potash	200	3·74	0·14
5	"	Check plot		4·04	0·52
6	"	Nitrate of soda Superphosphate Muriate of potash	320 600 200	6·44	0·90
7	"	Nitrate of soda Superphosphate	320 600	4·50	0·56
8	"	Nitrate of soda Muriate of potash	320 200	1·64	0·19
9	"	Superphosphate Muriate of potash	600 200	3·80	0·41
10	"	Check plot		3·00	0·34
11	"	Basic slag	1,000	4·32	0·48
12	"	Seeded to sweet clover in place of western rye grass		1·88	0·20
13	"	Seeded to sweet clover in place of western rye grass		3·36	0·38
			tons		
14	"	Barnyard manure	16	3·88	0·46
15	"	Barnyard manure	8	3·96	0·46
16	"	Check plot		2·20	0·25

RESULTS.—Nitrogen and potash supplied in commercial fertilizers did not materially influence the yield of corn, but where phosphate was applied either alone or in combination, the yield was considerably increased.

CO-OPERATIVE FERTILIZER EXPERIMENTS

Following up results obtained in small plots for some years showing that phosphate influenced the growth and yield of wheat, an effort was made to test its efficiency under farm conditions.

A demonstration on a neighbouring farm in 1928 gave increases of 8 and 12 bushels per acre for two rates of triple superphosphate sown with wheat on summer-fallow. The following year, in a dry season, eight demonstrations gave increases averaging 5½ bushels per acre for wheat on summer-fallow. A greater effort was made for 1930 to confirm results obtained and gather further information for farmers served by this Experimental Station.

Plans were therefore made to sow approximately 56 demonstrations within a radius of 60 miles from this Station. Material and equipment were necessary for such an undertaking. Triple superphosphate and ammonium phosphate were supplied without charge for this experimental work by the Consolidated Mining and Smelting Company of Canada, Limited, and laid down at railway points as required. Massey-Harris, John Deere Plow Company and Cockshutt Plow Company each supplied and serviced one combined seed and fertilizer drill. Two trucks, supplied by General Motors through R. Nelson and Company of Wilkie and D. D. MacMillian of Landis, were used to move the drills.

Commencing the first day of April, a survey of the area was made before seeding started, to locate the plots. Land was selected facing main travelled highways, close to towns, on land which represented the prevailing soil type, provided the owner was willing to co-operate. Every farmer who was chosen displayed a keen interest to assist in this work.

Seeding of these fertilizer plots with wheat, commenced on April 14 and continued until May 5. Several plots with oats, barley and flax were sown later. While the majority of these demonstrations consisted of three acres, totalling about ten acres, five demonstrations in this area contained approximately 90 acres each.

When weather permitted, three fertilizer drills were in operation. Two were moved on trucks. Loading and unloading was accomplished by using heavy planks. By using a truck, two demonstrations of ten acres were sown with a drill in one day and the outfit moved to a new location ready for the next day.

In this work the farmer supplied his own seed and four horses for the work. Plots were separated by driving on the wheelmark when adjoining plot was commenced. The area was carefully staked and shortly after grain emerged, signs were placed indicating where a fertilizer demonstration was located.

Periodic visits were made to these plots for note taking. Co-operators were supplied with forms on which to record their observations. Soil samples were taken from all these plots for a study in relation to the data obtained. To complete records, 10 double rod-rows of grain were carefully taken at harvest time.

Twenty of the fifty-six demonstrations sown cannot be reported principally because of the prolonged soil drifting in May or destructive hail in July or the terrific snow blizzard in October. While thanks are extended to all co-operators whose names are not mentioned, the thanks to all others are best expressed by the results in the tables which follow.

TABLE 41.—FERTILIZER DEMONSTRATIONS USING TRIPLE SUPERPHOSPHATE AND AMMONIUM PHOSPHATE

(Supervised by Dominion Experimental Station, Scott, Sask., 1930)

Co-operator	Soil type	Years cultivated	Treatment	Crop	Fertilizer rate—pounds per acre	Height end of June	Date headed	Date ready to cut	Days to mature	Yield per acre	Increase over check	Remarks
						in.				bush.	bush.	
F. W. Anderson, Scott.	Medium loam	21	Spring ploughed	Wheat	Check	9	July 20	Aug. 27	111	21·5	.....	A combination of early maturity and harvest weather made it possible to thresh fertilized plots 25 days earlier.
					T.S. 67	13	" 15	" 23	102	29·2	7·7	
					A.P. 72	13	" 16	" 20	105	34·3	12·8	
J. P. Baron, Reford.	Medium loam	19	Summer-fallow	Wheat	Check	7	July 26	Aug. 29	113	31·9	.....	Plots located in area subject to frost. Check plot barely escaped a frost of ten degrees on August 31.
					T.S. 84	10	" 22	" 25	109	35·4	3·5	
					A.P. 75	10	" 22	" 25	109	37·8	5·9	
E. L. Belliveau, Rutland.	Sandy loam	9	Summer-fallow	Wheat	Check	11	July 20	Aug. 25	129	22·6	.....	Soil drifting in spring damaged check plot but did not noticeably effect fertilized plots.
					T.S. 84	14	" 8	" 18	122	30·9	8·3	
					A.P. 75	14	" 8	" 18	122	30·6	8·0	
W. N. Belyk, Cando	Medium loam	15	Summer-fallow	Wheat	Check	8	July 18	Aug. 28	126	17·8	.....	This demonstration is unusual because triple superphosphate plot yielded more than the ammonium phosphate.
					T.S. 80	15	" 11	" 23	121	26·8	9·0	
					A.P. 72	15	" 11	" 23	121	22·4	4·6	
E. E. Bent, Landis.	Medium loam	15	Summer-fallow	Wheat	Check	12	July 15	Aug. 25	125	26·2x	.....	Fertilizer plots showed greater vigour and advanced maturity.
					T.S. 80	16	" 9	" 20	120	39·2x	13·0	
					A.P. 72	17	" 9	" 20	120	39·1x	12·9	
D. H. Buckwalter, Scott.	Medium loam	21	Summer-fallow	Oats	Check	8	July 19	Sept. 1	108	82·2x	.....	Stand on check plot thinned by wireworms, but practically no damage done on fertilized plots.
					T.S. 84	11	" 19	Aug. 27	103	97·5x	15·3	
					A.P. 75	11	" 19	" 27	103	97·8x	15·6	
J. Buglass, Traynor.	Medium to dark loam	14	Summer-fallow	Wheat	Check	8	July 5	Aug. 23	122	27·3x	.....	This plot was Reward wheat while practically all others were Marquis.
					T.S. 80	12	" 1	" 18	117	34·7x	7·4	
					A.P. 72	12	" 1	" 18	117	35·7x	8·4	
E. S. Conly, Primate.	Heavy clay	4	Summer-fallow	Wheat	Check	9	.....	Aug. 28	115	29·6x	.....	This field and Baron plots were sown late and gave small increases.
					T.S. 84	11	.....	" 25	112	32·1x	2·5	
					A.P. 75	11	.....	" 25	112	32·7x	3·1	
Rotation C, Experimental Station, Scott.	Medium loam	20	Summer-fallow	Wheat	Check	6½	July 21	Sept. 1	128	20·8	.....	Cropped 19 years to wheat, wheat, summer fallow Wild buckwheat smothered by fertilized grain crop.
					A.P. 51	12	" 11	Aug. 25	121	32·0	11·2	
Rotation J, Experimental Station, Scott.	Medium loam	16	Summer-fallow	Wheat	Check	7	July 18	Aug. 16	116	21·5	.....	Cropped 16 years to wheat, wheat, oats, hay, pasture and summer-fallow.
					A.P. 51	12	" 12	" 12	112	32·6	11·1	

"Bailey" Experimental Station, Scott.	Medium loam	22	Summer-fallow	Wheat	T.S. 60	11	July 9	Aug. 15	107	37·6	14·6	Note the little difference in yield between the fertilizer rates used in this test.
					T.S. 40	11	" 9	" 15	107	36·2	13·2	
					Check	6	" 14	" 25	117	23·0	.....	
					A.P. 34	12	" 9	" 16	108	36·7	13·7	
					A.P. 51	12	" 9	" 16	108	35·1	12·1	
"Bailey" Experimental Station, Scott.	Medium loam	22	Spring ploughed stubble	Wheat	Check	5	July 14	Aug. 20	112	17·6	.....	Fertilizer in this test was applied to wheat crop the previous year.
					T.S. 75	5	" 11	" 20	109	21·0	3·4	
					T.S. 100	5	" 9	" 15	107	25·1	7·5	
					T.S. 125	5	" 9	" 13	105	24·7	7·1	
H. Fell, Tramping Lake.	Clay loam	1	Breaking	Flax	Check	.....	.....	.....	.....	19·7	.....	Co-operator reports: "A lot more straw from fertilized plots."
					T.S. 60	.....	.....	.....	.....	23·9	4·2	
					A.P. 50	.....	.....	.....	.....	24·8	5·1	
W. Hall, Wolfe.....	Medium loam	17	Summer-fallow	Wheat	Check	9	July 17	Aug. 28	127	28·9x	.....	Co-operator reports: "No weeds could possibly live in heavy growth on fertilized plots."
					T.S. 80	17	" 11	" 18	117	36·9x	8·0	
					A.P. 72	18	" 11	" 18	117	36·1x	7·2	
J. W. Hamilton, Unity.	Medium to sandy loam	11	Summer-fallow	Wheat	Check	9	July 10	Aug. 24	132	14·8	.....	Unfertilized wheat was badly scorched with hot, dry weather.
					T.S. 84	12	" 5	" 18	126	32·5	17·7	
					A.P. 75	13	" 5	" 18	126	43·7	28·9	
G. R. Hart, Landis.	Dark medium loam	13	Summer-fallow	Wheat	Check	12	July 19	Aug. 27	130	30·7x	.....	Darker colour of fertilized plots showed up two miles away early in the season.
					T.S. 80	18	" 13	" 21	124	35·1x	4·4	
					A.P. 72	18	" 13	" 21	124	39·0x	8·3	
Sam Hind, Broadacres.	Medium loam	.....	Summer-fallow	Wheat	Check	9	July 12	.....	.....	18·1x	.....	Frenchweed bad in field but almost smothered in fertilized plots.
					T.S. 80	12	" 5	.....	.....	25·6x	7·5	
					A.P. 72	13	" 5	.....	.....	24·6x	6·5	
Dan Hughes, Wilkie	Medium loam	.....	Summer-fallow	Wheat	Check	10	July 19	Aug. 30	128	31·0x	.....	Heavy weed growth started in all plots but was choked out in fertilized plots.
					T.S. 80	17	" 12	" 23	121	43·1x	12·1	
					A.P. 72	17	" 13	" 23	121	41·4x	10·4	
Alf Jack, Cut Knife.	Dark medium loam	7	Summer-fallow	Wheat	Check	8	July 21	Aug. 29	132	23·7x	.....	Yield of all plots reduced by serious infestation of root-rot.
					T.S. 80	12	" 10	" 23	126	34·8x	11·1	
					A.P. 72	12	" 10	" 23	126	36·7x	13·0	
Jim Jack, Adanac...	Dark medium loam	23	Summer-fallow	Wheat	Check	.....	.....	Sept. 2	117	21·1	.....	Fertilized wheat graded 3 Northern and check plot graded 5.
					T.S. 40	.....	.....	Aug. 23	107	30·6	9·5	
					A.P. 37	.....	.....	" 23	107	30·7	9·6	
Jim Jack, Adanac...	Dark medium loam	23	Spring ploughing	Wheat	Check	.....	.....	Sept. 2	117	21·1	.....	Difference in yield and grade on 117 acres gave increased returns of $506.58.
					T.S. 40	.....	.....	Aug. 23	107	32·4	11·3	
					A.P. 37	.....	.....	" 23	107	33·3	12·2	
Jim Jack, Adanac...	Dark medium loam	23	Spring ploughing	Barley	Check	.....	.....	.....	.....	33·2	.....	Fertilized barley graded 2 C.W., but check plot was frozen.
					A.P. 37	.....	.....	.....	.....	45·8	12·6	
T. Kaufmann, Leipzig.	Medium loam	22	Summer-fallow	Wheat	Check	11	July 17	Aug. 21	127	21·5	.....	This area had a good distribution of moisture throughout the growing season.
					T.S. 80	16	" 11	" 14	120	35·3	13·8	
					A.P. 72	17	" 11	" 14	120	35·3	13·8	
F. Krips, Tako.....	Clay loam	1	Breaking	Flax	Check	8	.....	.....	.....	8·0	.....	Fertilized crop more vigorous, particularly the ammonium phosphate plot.
					T.S. 84	10	.....	.....	.....	9·5	1·5	
					A.P. 75	11	.....	.....	.....	11·0	3·0	
R. R. Knowles, Unity.	Medium loam	19	Summer-fallow	Wheat	Check	11	July 12	Aug. 25	121	32·4	.....	Wheat in this area was frozen on May 22, but fertilized plots recovered quickly.
					T.S. 84	14	" 7	" 18	124	41·2	8·8	
					A.P. 75	15	" 7	" 18	124	43·5	11·1	
R. Martin, Phippen.	Medium loam	15	Summer-fallow	Wheat	Check	10	July 12	Aug. 28	128	8·0x	.....	Yield increase remarkable because field infested with wireworms and annual weeds.
					T.S. 84	15	" 6	" 20	120	21·0x	13·0	
					A.P. 75	15	" 7	" 20	120	21·8x	13·8	

TABLE 41.—FERTILIZER DEMONSTRATIONS USING TRIPLE SUPERPHOSPHATE AND AMMONIUM PHOSPHATE

(Supervised by Dominion Experimental Station, Scott, Sask., 1930)

Co-operator	Soil type	Years cultivated	Treatment	Crop	Fertilizer rate—pounds per acre	Height end of June	Date headed	Date ready to cut	Days to mature	Yield per acre	Increase over check	Remarks
						in.				bush.	bush.	
E. S. Meiklejohn, Wilkie.	Medium loam	20	Summer-fallow	Barley	Check	3½	July 22	Sept. 6	98	48·2x	.....	Influence of these fertilizers on barley is well illustrated by the yields shown.
					T.S. 84	3½	" 17	" 1	93	62·2x	14·0	
					A.P. 75	4	" 17	" 1	93	79·7x	31·5	
G. N. Miller, Handel	Medium loam	.....	Summer-fallow	Wheat	Check	9	July 22	Aug. 21	126	24·1	.....	Fertilized plots took a pound of twine more per acre than the check plot.
					T.S. 80	16	" 14	" 15	120	34·0	9·9	
					A.P. 72	17	" 14	" 15	120	34·1	10·0	
T. Nadon, Scott.....	Medium loam	20	Disked stubble	Oats	Check	10	.....	.....	.....	58·1	.....	The only demonstration in this series where fertilizer was sown with oats on disked stubble.
					T.S. 84	13	.....	.....	.....	71·6	13·5	
					A.P. 75	13	.....	.....	.....	73·0	14·9	
H. Neufeld, Evesham.	Medium loam	15	Summer-fallow	Wheat	Check	10	July 8	Aug. 25	130	37·3	.....	Ammonium phosphate in this case is earlier but lower in yield than triple superphosphate.
					T.S. 84	16	" 4	" 18	123	48·0	10·7	
					A.P. 75	16	" 3	" 17	122	46·0	8·7	
H. M. Olsen, Phippen.	Medium loam	15	Summer-fallow	Wheat	Check	9	July 19	Aug. 29	129	19·7	.....	Fertilized land had even growth, but check plot had spots of uneven late maturing growth.
					T.S. 84	16	" 12	" 20	120	30·3	10·6	
					A.P. 75	17	" 13	" 20	120	30·9	11·2	
Ed. Scheidt, Luseland.	Clay loam	19	Summer-fallow	Wheat	Check	8	July 21	Sept. 1	130	20·3	.....	Co-operator reports: "Check graded 3 and fertilizer plots No. 1 Northern."
					T.S. 84	13	" 9	Aug. 21	119	31·3	11·0	
					A.P. 75	13	" 12	" 21	119	27·8	7·5	
H. Sewell, Adanac..	Dark medium loam	23	Spring ploughing	Wheat	Check	.....	July 13	Aug. 27	120	28·2	.....	Check was sown 3 days late and thus explains figures in maturity.
					T.S. 50	.....	" 5	" 20	116	38·3	10·1	
H. Sewell, Adanac..	Dark medium loam	8	Summer-fallow	Wheat	Check	.....	July 16	Aug. 30	120	38·6	.....	Sown on different dates. Check plot rusted. Red Bobs grown.
					A.P. 40	.....	" 8	" 22	120	49·3	10·7	
T. E. Sprigg, Biggar.	Medium loam	16	Summer-fallow	Wheat	Check	14	July 12	Aug. 24	125	20·0	.....	Like other tests, fertilized plots were outstanding and attracted considerable attention.
					T.S. 80	17	" 6	" 17	118	28·7	8·7	
					A.P. 72	17	" 6	" 17	118	30·9x	10·9	
T. E. Wright, Kerrobert.	Medium loam	24	Summer-fallow	Wheat	Check	8	July 18	Aug. 30	129	21·0	.....	This land differed from ordinary summer-fallow in that sweet clover sod was ploughed down.
					T.S. 84	15	" 12	" 23	122	32·0	11·0	
					A.P. 75	15	" 12	" 23	122	32·0	11·0	

EXPLANATORY NOTE.—Under the column headed "Fertilizer" the letters T.S. and A.P. stand for triple superphosphate and ammonium phosphate respectively. Where x appears after yield per acre figures, these represent yields calculated by the rod-row method.

A mere glance at the tabular information concerning these phosphate fertilizer demonstrations is not sufficient. These require careful study. Much information and many observations could not be recorded in these tables. There are a number of things from this undertaking which should be discussed.

Phosphate soon demonstrated its influence on early growth of grain, particularly in wheat, over adjacent plot sown without fertilizer. Careful observance showed on early sown plots more rapid emergence. A more even stand was in evidence from the start. Darker green colour was exhibited before many days had passed. Greater vigour of plants was always in evidence —shown by broader leaves, taller growth and larger root systems. Under the usual condition of dry weather in May and early June, the ordinary wheat crop made little progress, but those sown with phosphate continued their growth and stooled quicker, more evenly, and had a higher percentage of tillers. Evidence concerning influence on early growth can be shown by height of plants at end of June. At this time average height for wheat on summer-fallow was: untreated, 9·5 inches, triple superphosphate, 14·3 inches, and ammonium phosphate, 14·7 inches.

Influence on weeds in crop was observed. In this area the common annual weeds are frenchweed, pigweed, wild buckwheat and wild oats. Early in the season, weeds and crop started out on an almost even footing. Under the heavy growth of fertilized plots, these weeds were literally smothered.

During the past two seasons, an effort was made to locate plots on land infested with wireworm. In 1929, wheat yield was doubled on a wireworm area. In 1930, yield was increased from 8 to 21 bushels but weeds played an important part where wireworms cut off the plants. A 15 bushel increase was recorded for oats on a wireworm field. Apparently the influence on early growth already mentioned was responsible for lessening the damage by wireworms.

Rapidity of growth was maintained as the crop progressed. Phosphate fertilizers advanced heading on the average of 6½ days and date of ripening 7 days in 1930. Practically no difference was recorded between influence of triple superphosphate and ammonium phosphate in advancing maturity. Although there was a striking difference in height early in the season, this difference practically disappeared at harvest time. A clear contrast was in evidence by the evenness of height and uniformity of ripening in fertilized plots compared to the unevenness in these respects for check plots.

Differences in maturity were reflected in subsequent handling of the crop and market value. A week earlier in cutting in a number of cases, meant several weeks' advance in threshing and by avoiding wet weather, its commercial grade was advanced. By escaping early fall frosts in several cases, the grade was advanced by fertilizer depending on maturity. Rust damage was avoided by the use of fertilizer in one field where a susceptible variety was grown.

From 23 demonstrations with wheat on summer-fallow, the yields of wheat were increased 10 bushels per acre. For these fields, there was only an average increase of 6 pounds per acre between the two fertilizers, in favour of ammonium phosphate. (Increased yields in favour of this fertilizer were recorded in the case of barley, oats and flax.) In one case, an increase of 9½ bushels and spread in grades due to frost amounting to 9 cents per bushel, gave net returns in favour of phosphate fertilizer amounting to $506.58 on 117 acres. The increase of twine required for fertilized plots is usually welcomed where the binder is used because of its association with higher yield.

Land on which these tests were conducted, varied in length of time cultivated from one to 24 years. A correlation did not exist between the years

cropped and increase from phosphate fertilizer. It is evident that there is a deficiency of the phosphorous requirement in soils of this area. Sweet clover ploughed down before fallowing responded well to these fertilizers.

The date of seeding fertilizer with wheat appears to be an important factor. The largest increase was obtained from first plots sown on April 14 and smallest increase from plot last sown on May 5. Seeding extended over three weeks. Average increase from plots sown first week was 11·25 bushels per acre; for the second week 10·10 bushels, and for three plots sown the third week 5·50 bushels. As with other data presented, further work is necessary to corroborate this.

No mention has been made of any disadvantages which have presented themselves from using these phosphate fertilizers. In the dry year of 1929 there was insufficient moisture to fill the heavy potential crop on fertilized fields, consequently the grain was shrunken resulting in lower weight per bushel. This was offset by residual increases of 3 to 7 bushels per acre the following year when there was a fair distribution of moisture. On stubble land in a dry year, no increase was recorded.

Rates on medium soils would appear to be 40 pounds of ammonium phosphate per acre and 50 pounds triple superphosphate. Heavy soils were able to make more economical use of higher rates.

Work on phosphate fertilizers to date indicates that this class of fertilizer is destined to play an important part in our crop production and that there is room for a comprehensive study of this problem.

HORTICULTURE

VEGETABLES

Spring opened early and first vegetable seed was sown April 8. The majority of outside vegetable seed was sown in the latter part of April. Early growth was severely checked by high winds which were prevalent during May and June. Severe frost damage was caused on May 22 when an unusual frost of eleven and a half degrees was recorded. Mid-season conditions were favourable as regards temperature and moisture distribution, resulting in good average vegetable yields. Growth of tender vegetables finished on August 31 when the temperature dropped to 28° Fahrenheit.

ASPARAGUS

In 1930, first cuttings of asparagus were taken on May 22 and continued three times a week until the end of June. Both Colossal and Argenteuil varieties yielded approximately 36 pounds from five 30 foot rows of each variety. Covering the past 11 years, Colossal has yielded approximately forty per cent higher than Argenteuil.

BEANS

First beans were picked on July 27—two months after seeding. Usually this vegetable is ready for use about a week earlier, at this Station. Varieties averaged 10 pounds from a 30-foot row this year, which is about 30 per cent higher than a seven year average. A test of varieties shows little difference in yield but considerable in quality. Some good varieties are Stringless Green Pod, Wardwell Kidney Wax, Davis White Wax, and Challenge Black Wax.

TABLE 42—DISTANCE OF PLANTING BEANS
(Project H. 58)
Average 8 years, 1923–1930

Distance	Yields per 30-foot row			
	Round Pod Kidney Wax		Stringless Green Pod	
in	lb.	oz.	lb.	oz.
2	7	3	8	8
4	6	0	6	10
6	5	5	5	14

Eight years study of distance of planting beans, using two varieties in 30-foot rows, has shown quite definitely that planting two inches apart has given higher yields than planting four and six inches. This project is now concluded.

BEETS

Uniform size and quality characterizes beets grown in 1930. Seven varieties were tested. Because Detroit Dark Red has, over a period of years, given highest yields and best quality, four strains of this variety were also tested.

TABLE 43—DATES OF SEEDING BEETS
(Project H. 65)
Average 8 years, 1923-1930

Order of seeding	Average date	Yield from 30-foot row	
		lb.	oz.
First	April 23	92	1
Second	May 4	83	4
Third	May 14	70	3
Fourth	May 24	74	5
Fifth	June 3	55	3
Sixth	June 13	28	9

A summary of eight years work with dates of seeding beets is shown above. Detroit Dark Red was the variety used. Seeding commenced each year as soon as possible and continued at ten day intervals with six sowings. Early sowings of beets have given higher yields, consistent with good quality. This project was concluded in 1930.

BRUSSELS SPROUTS

For a number of years, one or two varieties of Brussels Sprouts have been grown. At this Station it has been found that the growing season is too short to properly mature this vegetable. In an average season, less than ten per cent reach the cooking stage.

CABBAGE

Average yields of cabbage were obtained from 25 varieties and strains grown during the past season. These included one variety of red cabbage and a few of Savoy. The seed was started under glass and planted out on June 16. Drought and wind delayed transplanting outside about a week later than usual.

Covering the past five years, Copenhagen Market has given the highest yield of good quality cabbage. During the same period, Golden Acre has taken second place, yielding approximately thirty per cent less, but it has a tendency to split open in the garden just as it reaches maturity.

In addition to variety work with cabbage, a study is in progress to determine the best date to seed cabbage for storage. The seed is sown directly outside and the plants are thinned out to the required distance. Copenhagen Market, an early variety, and Danish Ballhead, a later variety, are used for this project. This work must continue for some years more before definite conclusions can be reached.

CAULIFLOWER

Seven varieties of cauliflower were tested in 1930. These produced an average yield of 70 pounds per 30-foot row. Early Snowball was ready for use on July 21 and finished growth one month later. Autumn Giant was ready on August 25 and continued to produce until the end of September. By sowing these two varieties cauliflower can be used throughout the season.

CARROTS

All of the ten varieties and strains of carrots grown in 1930 yielded well above the average of the past five years. Considering yield, quality and storing for winter use, Chantenay is the leading carrot tested over a period of years.

TABLE 44—DATES OF SEEDING CARROTS
(Project H. 79)
Average 8 years, 1923-1930

Order of seeding	Average date	Yield from 30-foot row	
		lb.	oz.
First	April 23	61	10
Second	May 4	54	0
Third	May 14	51	3
Fourth	May 24	44	6
Fifth	June 3	35	10
Sixth	June 13	20	5

Covering a period of eight years, it has been found that the highest yield of carrots is produced from earliest seeding, and that the yield decreases with successive later seedings. This project was concluded in 1930.

CELERY

A heavy crop of good quality celery was harvested in 1930. Twelve varieties or strains were grown. All varieties were started early under glass and set outside on June 14. Golden Self Blanching continues to lead in yield and produces a crop of desirable quality.

CITRON

Except in 1928, citron has matured sufficiently for table use five out of the past six years. This vegetable is extremely susceptible to frost and must be considered in both sowing and harvesting time. Of the two varieties tested together for the years mentioned, Colorado is somewhat earlier, but Red Seeded gives a higher yield in seasons when the frost-free period is longer than usual.

CORN

None of the 17 varieties of corn sown on May 8 produced table ears before the first killing frost on August 31. In the dates of seeding, corn sown on April 8, and several later seedings, commenced to produce table corn on August 9 (for the earliest variety). Under conditions existing at this Station, Banting is recommended, with Pickaninny as second choice for sweet corn.

CUCUMBERS

After testing several methods, the most satisfactory procedure for cucumbers at this Station has been found to be sowing directly outside in rows four feet apart, and thinning the plants to one foot in the row. Seeding usually takes place the first week in June. Several varieties have been tested continuously for the past six years and Early Russian has given the highest yield.

EGG PLANT

Frost-free period, combined with soil conditions, do not allow egg plants to mature at Scott every year. Its production demands starting seed inside, hardening off the plants and setting out when danger of frost has passed. The Extra Early Dwarf variety has been the earliest tested, but cannot be safely recommended to produce a crop every year.

LETTUCE

Two sowings of fifteen varieties of lettuce were made in 1930. These included the common commercial types. In tests of this vegetable, the rows are made eighteen inches apart and plants thinned out to six inches apart in the row. Varieties recommended are: Head—New York and Hanson; Leaf—Grand Rapids and Black Seeded Simpson; Cos—Paris White Cos and Trianon Cos.

MUSKMELON

No commercial variety of muskmelon can be depended upon to mature at this Station, according to tests made with nineteen different sorts. A selection was made in 1926 which can be depended on to ripen. This early strain, from a variety of unknown Russian origin, is known at this Station as "Scott Select."

ONIONS

Onion varieties yielded a bountiful crop of good quality in 1930. Seventeen varieties were under test. Of the eleven varieties tested continuously for the past five years, those recommended are Danvers Yellow Globe, Large Red Wethersfield, and Ailsa Craig.

PARSNIP

Hollow Crown has proved to be the highest yielding parsnip when compared with four other varieties tested at this Station for the past six years. Under soil conditions here, it has a tendency to grow too long a root and is therefore difficult to harvest. Varieties more recently tested give promise of overcoming this objection.

TABLE 45—DATES OF SEEDING PARSNIPS
(Project H. 142)
Average 8 years, 1923-1930

Order of seeding	Average date	Yield from 30-foot row	
		lb.	oz.
First	April 23	92	1
Second	May 4	83	4
Third	May 14	70	3
Fourth	May 24	74	5
Fifth	June 3	55	3
Sixth	June 13	28	9

The above table shows higher yields from early seedings. All seedings have been found equally difficult to harvest. Better eating qualities were found in earlier sowings. This project was concluded in 1930.

PEAS

A large number of pea varieties are offered on the market. Some eighty-five varieties and strains have been tested here for the past nineteen years. These varieties can be grouped according to maturity as early, medium, and late. By sowing some of all three types, green peas can be available for use from the middle of July until damaging frosts appear. Varieties recommended are: Early—Little Marvel and Gregory Surprise; Medium—Thomas Laxton, Homesteader, and Gradus; Late—Stratagem.

TABLE 46—DISTANCE OF PLANTING PEAS
(Project H. 148)
Average 8 years, 1923-1930

Distance	Yield from 30-foot row					
	English Wonder		Thomas Laxton		Stratagem	
in.	lb.	oz.	lb.	oz.	lb.	oz.
1	9	4	7	12	8	8
2	7	4	7	3	7	5
3	7	5	6	9	6	14

Planting peas one inch apart in the rows has given higher yields than planting two and three inches. This project was concluded in 1930.

TABLE 47—DOUBLE VERSUS SINGLE ROWS FOR PEAS
(Project H. 149)
Average 5 years, 1926-1930

Distance	Yield from 30-foot rows			
	Double rows		Single rows	
in.	lb.	oz.	lb.	oz.
2	9	13	5	4
4	8	4	5	4
6	8	1	5	4

All peas in project H. 149 were sown one inch apart in the row. The distance column refers only to the double rows. This experiment, concluded in 1930, has shown that double rows yield higher than single rows and that two inches is the best distance between the double rows. Double-row planting makes more economical use of a small area.

PEPPERS

During the past ten years, six crops of green peppers were harvested and in three of these years the peppers were ripe from Harris Earliest and Squash or Tomato varieties. No crop was harvested in 1930.

POTATOES

Slightly below average in yield, but well above average for quality and freedom from disease, summarizes the potato tests for 1930. Covering a period of years in vegetable work, it may be truly said that potatoes, while more commonly grown than other vegetables, receive less consideration than most other garden crops. Good varieties to grow for Northwestern Saskatchewan include Irish Cobbler, Early Ohio, Gold Coin, Gold Nugget, and Everett. Certified seed of these varieties is produced annually at this Station.

PUMPKIN

This season produced the heaviest yield of pumpkins on record at this Station. There was a large number of pumpkins per plant, but they were of only average size. This is a tender vine crop, but it has failed only two years out of seventeen. Varieties which have done well here are Connecticut Field, King of the Mammoth, Sweet Sugar and Pie.

RADISH

Usually ten varieties of radish are tested each season. Two sowings are made to prolong the supply. This is an easy vegetable to grow and should be in every garden. Twenty Day variety has proved to be the best among those tested here, followed by French Breakfast and White Icicle.

RHUBARB

Six varieties of rhubarb are under test. Every four or five years the roots are divided and replanted, usually in September. Hobdays Giant is a green and sour variety. In colour and quality, Ruby excels. There is little to choose between MacDonald and Victoria in quality, but the latter is a much heavier yielder.

SPINACH

Spinach makes a suitable crop for early greens. All varieties tested at this Station produce readily and are usually ready for use about the middle of June. Some good varieties are King of Denmark, Broad Flanders, and Princess Juliana.

SQUASH

A heavy crop of squash was harvested in 1930, but this vegetable is not in popular demand. Squash and vegetable marrow are grown in the same way, but the latter is a heavier yielder. Some good varieties of squash are Golden Hubbard and Hubbard. Vegetable marrows which have yielded well are Long White Bush and English Vegetable.

SWISS CHARD

This vegetable produces greens from early in July until destroyed by killing frosts. Ribs of Swiss chard can be used as a substitute for celery in the summer months. Recommended varieties are Fordhook and Lucullus.

TOMATOES

Forty-three varieties and strains of tomatoes were tested in 1930. Ninety-seven varieties have been under test during the past nineteen years. Earliness is the deciding factor for conditions at this Station and in this respect Alacrity leads, followed by Bonny Best.

TURNIPS

A test of turnips includes both summer and swede varieties. The former is best for quality, but the latter can be left until early fall and stored for winter use. There are a large number of commercial varieties; a few of which are, White Stone and Early Purple Milan for summer turnips, and Canadian Gem and Ditmars for swede turnips.

FRUIT TREES

APPLES

During the winter of 1929-30, winter killing of apples was severe. Over 200 replacements from the Dominion Experimental Stations at Morden and Rosthern were made in the spring of 1930. No standard apples, and very few of the crab apples, have reached bearing age under natural conditions at this Station.

Whether the killing took place in late fall, winter, or early spring, it has not been definitely determined, but the problem is receiving attention. The probable yield of crab apples was greatly reduced this year by frost on May 22 when the trees were coming into bloom. Trees which bore fruit were Osman, Prince, Jewel, Jewel x Simbirsk, Jewel x Tetofsky and Northern Queen x Cranberry Pippin.

PLUMS AND CHERRIES

A number of Manitoba Native plums were dead in the spring of 1930. Only a small percentage of those remaining produce edible small fruit. A few trees of Sapa and Opata varieties still survive. These produce fruit much superrior to the native plum. Most of the plums in 1930 were destroyed by early frosts. Old trees of Rocky Mountain or Sand cherry are only partially alive and Compass cherry trees are dead. Several other varieties of plums and cherries are under test.

SMALL FRUITS

Except in years of severe drought, small fruits have yielded well at this Station. It has been found that winter protection is necessary for strawberries and raspberries but is not required for currants and gooseberries. Among commercial varieties of different small fruits tested, the following two of each are recommended.

Red raspberry—Herbert and Sunbeam.
Black currant—Saunders and Climax.
Red currant—Pomona and Raby Castle.
White currant—Large White and White Grape.
Gooseberry—Silvia and Charles.
Strawberry (summer bearing)—Senator Dunlap and Dakota.
Strawberry (everbearing)—Americana and Superb.

ORNAMENTAL TREES AND SHRUBS

Following a dry summer, fall and spring, with a heavy frost in the third week of May, flowering trees and shrubs were unable to display their full beauty in 1930 and leaves and bloom did not fully develop. Bloom which did appear was short lived. Nine new specimens were introduced to this Station and planted in 1930.

Maple dead, but ash and elm survive.

Without entering into description, the following is a partial list of decorative shrubs which have been found quite hardy at this Station: Lilac, Mountain ash, Tartarian maple, Flowering almond, Missouri currant, Cotoneaster, Honeysuckle, Potentilla, Caragana (all varieties), *Spiræa triumphans*, Spiræa Van Houttei, *Spiræa sorbifolia*, Chokecherry, Dogwood, Viburnum, Sumach, Hawthorn and Ninebark.

FLOWERS

Except for tulips which suffered from drought, there was a continuous display, with large sized flowers in most cases, from spring until their blooming period finished or was stopped by early fall frosts. Early blooming perennials had small flowers of shorter duration than usual, due to lack of subsoil moisture. For a complete list of flowers suitable for this area, the reader is referred to pages 34 and 35 of the report from this Station for 1929.

CEREALS*

In this report only cereal varieties on summer-fallow in triplicate one-fortieth acre plots are recorded. In addition, 173 varieties and strains of cereals were tested in rod-row plots. Selections from named varieties totalled 99 and those from recent crosses amounted to 35. There were 49 new introductions in 1930. There were 123 cereal co-operators testing varieties in rod-row plots, in Northwestern Saskatchewan, 79 of whom were in co-operation with the Saskatchewan Wheat Pool.

WHEAT

Wheat varieties were seeded in one-fortieth acre plots on April 23—four days ahead of the average date for this work. There was sufficient moisture for germination but temperatures were cool. Varieties germinated from 15 to 20 days, depending on the variety. All varieties were frozen down on May 23. Distribution of moisture favoured a uniform growth and all plots soon presented a pleasing appearance. Harvesting was performed under favourable conditions.

TABLE 48—WHEAT—TEST OF VARIETIES OR STRAINS, 1930

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	Commercial grade
			in.		bush.	%	lb.	
Ceres	Aug. 21	120	36·9	7·8	44·2	103·8	63·0	1 N.
Early Red Fife, Ottawa 16	" 26	125	37·5	9·3	40·9	96·0	62·0	1 N.
Early Triumph	" 18	117	34·8	9·5	43·9	103·1	63·0	1 N.
Garnet, Ottawa 652	" 14	113	33·1	8·8	43·9	103·1	63·5	2 N.
Kitchener	" 25	124	35·8	9·5	42·0	98·6	63·0	1 N.
Kubanka, Sask. 6	" 28	127	44·9	6·3	41·2	96·7	62·0	1 Durum
Marquis, Ottawa 15	" 22	121	33·8	8·5	42·6	100·0	64·0	1 N.
Marquis 10B	" 22	121	35·0	8·9	40·6	95·3	64·0	1 N.
Marquillo	" 21	120	32·0	10·0	41·6	97·7	62·0	2 N.
Mindum	" 25	124	42·3	6·9	40·8	95·8	63·0	1 Durum
Pelissier	" 28	127	38·6	6·8	39·8	93·4	62·0	2 Durum
Red Bobs (Wyler)	" 19	118	34·5	9·4	44·3	104·0	64·0	1 N.
Red Bobs 222	" 19	118	34·2	9·6	43·5	102·1	63·0	1 N.
Red Fife, Ottawa 17	" 28	127	38·6	9·2	38·4	90·1	61·0	1 N.
Reliance	" 22	121	34·1	8·1	44·5	104·5	64·0	1 N.
Renfrew	" 25	124	39·9	9·7	39·3	92·3	61·0	1 N.
Reward, Ottawa 928	" 16	115	32·1	9·4	38·9	91·3	66·0	1 N.
Supreme	" 20	119	32·8	9·9	43·3	101·6	64·0	1 N.

*Under the supervision of F. M. MacIsaac, B.S.A.

TABLE 49—WHEAT—SIX-YEAR AVERAGE, 1925–1930

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.	%	lb.
Early Red Fife, Ottawa 16	120·5	39·1	9·3	31·0	90·9	62·9
Early Triumph	112·8	36·2	9·8	36·3	106·5	61·8
Garnet, Ottawa 652	108·3	34·9	9·0	36·0	105·6	62·1
Kitchener	120·3	38·1	9·3	33·2	97·4	62·2
Kubanka, Sask. 6	124·8	41·9	6·2	31·9	93·5	62·5
Marquis, Ottawa 15	117·5	36·3	9·3	34·1	100·0	62·6
Marquis 10 B	117·5	36·2	9·4	33·3	97·7	62·3
Red Bobs (Wyler)	113·7	35·9	9·8	36·7	107·6	61·7
Red Fife, Ottawa 17	123·3	37·6	9·1	31·1	91·2	61·6
Reward, Ottawa 928	110·3	36·0	9·6	34·0	99·7	63·9
Supreme	115·2	34·8	9·9	35·2	103·2	62·2

Varieties of wheat yielded above the average in 1930, but Reward and Red Fife were comparatively low. The former did not recover as quickly as other varieties from the frost of May 23, but the latter occupies its usual low position. The average for six years is a much better indication of their value. In this case it will be observed that there is less than a six-bushel spread in yield, but a fifteen-day spread in time of maturity. Yield and maturity are the most important considerations in Northwestern Saskatchewan for good common spring wheat varieties and must be considered together in evaluating varieties. Durums at this Station are tall, weak in the straw, comparatively late and below standard for yield. The Red Bobs group represented by Early Triumph, Red Bobs and Supreme, are medium early and high in yield, but suffer worse from stem rust than most of the other varieties listed. Early Red Fife has not performed sufficiently well on the Station or in co-operative trials to warrant its cultivation in this district. Where Marquis cannot be grown because of late summer frosts, an early variety such as Garnet or Reward should be grown.

OATS

Surface soil was comparatively dry when oat varieties were sown on May 16. Patchy stands resulted and approximately twenty per cent of the kernels did not germinate till after rains in the second week of June. A moderate rainfall with good distribution produced high yields.

TABLE 50—OATS—TEST OF VARIETIES OR STRAINS, 1930

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	Commercial grade
			in.		bush	%	lb.	
Abundance	Aug 27	103	44·5	8·0	76·1	88·1	38·5	3 C.W.
Alaska	" 19	95	39·8	8·8	74·0	85·6	40·0	2 C.W.
Banner, Ottawa 49	" 29	105	44·7	7·0	86·4	100·0	31·0	2 Feed
Banner, Sask. 144	" 29	105	45·7	8·4	89·4	103·5	31·0	2 Feed
Cole, Sask. 795	" 18	94	38·7	6·0	85·2	98·6	35·0	3 C.W.
Gerlach	" 30	106	45·8	7·5	83·1	96·2	33·0	3 C.W.
Gopher	" 22	98	36·3	8·0	89·6	103·7	41·0	2 C.W.
Irish Victor P	" 27	103	46·3	8·0	76·1	88·1	36·0	3 C.W.
Laurel, Ottawa 477	" 26	102	39·3	9·8	72·6	84·0	51·0	Hulless
Leader	" 29	105	46·0	7·0	85·7	99·2	.....	.....
Legacy, Ottawa 678	" 25	101	40·9	7·2	89·9	104·1	33·0	2 Feed
Liberty, Ottawa 480	" 25	101	42·6	9·7	57·7	66·8	48·0	Hulless
Victory	" 30	105	46·3	8·6	89·3	103·4	32·0	2 Feed

TABLE 51—OATS—SIX-YEAR AVERAGE, 1925–1930

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.	%	lb.
Alaska	92·5	36·7	9·0	65·0	86·6	38·3
Banner, Ottawa 49	103·8	39·5	8·3	75·1	100·0	35·7
Banner, Sask. 144	104·3	39·7	8·5	75·9	101·1	35·1
Cole, Sask. 795	91·3	34·6	8·1	67·7	90·1	34·2
Gerlach, Sask	104·8	39·2	8·3	72·9	97·1	35·9
Laurel, Ottawa 477	99·7	37·5	9·6	60·8	81·0	50·9
Leader	104·8	39·0	7·9	71·7	95·5	35·8
Legacy, Ottawa 678	98·5	39·9	8·9	77·9	103·7	35·6
Liberty, Ottawa 480	98·7	39·9	9·5	49·4	65·8	48·6
Victory	105·2	39·3	8·7	74·5	99·2	37·6

Weight per bushel is the unusual feature in the table on oat varieties for this year. Early varieties usually weigh less per bushel than do the later varieties, but this year the reverse was the case. Hot weather adversely affected late varieties in 1930, resulting in weight per bushel being below standard. In the table showing averages for six years, a more reliable guide is presented. Here we find early varieties such as Alaska and Cole low in yield. Late varieties such as Banner and Victory are good in all respects. Legacy, a medium maturing oat, has given a good account of itself.

BARLEY

Barley was seeded one day later than oats but made comparatively better progress early in the season. With this advantage, barley did not suffer like oats from heat at time of filling.

TABLE 52.—BARLEY—TEST OF VARIETIES OR STRAINS, 1930

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	Commercial grade
			in.		bush.	%	lb.	
Bearer, Ottawa 475	Aug. 26	101	40·9	8·7	46·7	101·5	46·5	4 C.W.
Canadian Thorpe	" 28	103	38·7	8·8	43·4	94·3	48·0	Extra 2 C.W
Colsess	" 17	92	37·1	9·1	68·6	149·1	49·0	5 C.W.
Duckbill, Ottawa 57	" 28	103	36·8	8·8	45·9	99·8	48·0	Extra 2 C.W
Gold	" 25	100	32·4	6·5	55·6	120·9	50·5	Extra 3 C.W
Hannchen, Sask. 229	" 24	99	34·5	7·8	52·5	114·1	52·0	"
Himalayan, Ottawa 59	" 15	90	32·0	5·0	57·7	125·4	63·0	3 C.W.
*Horn	" 24	99	35·0	5·0	61·9	134·6	52·0	Extra 2 C.W
Mensury, Ottawa 60	" 21	96	43·1	9·1	49·3	106·2	48·0	Extra 3 C.W
O.A.C. 21	" 22	97	42·0	9·2	46·0	100·0	49·0	"
†Plumage Archer	" 30	105	33·8	6·5	35·6	77·4	46·0	4 C.W.
Star	" 18	93	34·1	6·5	40·9	88·9	47·0	5 C.W.
Trebi	" 22	97	34·3	8·5	66·0	143·5	51·0	2 C.W.

*One plot only. †Two plots only.

TABLE 53.—BARLEY—SIX-YEAR AVERAGE, 1925-1930

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.	%	lb.
Bearer, Ottawa 475	102·2	35·7	6·9	36·5	91·3	47·6
Duckbill, Ottawa 57	104·4	33·6	9·5	35·3	88·3	49·7
Hannchen, Sask. 229	99·0	31·8	7·6	47·1	117·8	51·8
Himalayan, Ottawa 59	90·8	30·6	8·3	43·4	108·5	62·6
Gold	100·2	30·1	7·0	46·5	116·3	51·3
Mensury, Ottawa 60	96·4	36·4	8·5	42·1	105·3	48·2
O.A.C. 21	96·6	36·7	8·4	40·0	100·0	47·4
Trebi	95·6	30·6	8·7	53·5	133·8	47·6

A glance at the barley yields for 1930 shows that Colsess leads. This variety gives promise of meeting a demand for an early, high yielding variety to help compete against wild oats. In a three-year average it has yielded more than Hannchen and is only exceeded by Trebi. In the six-year average, Himalayan, a hulless sort, has yielded well but it requires special care in harvesting or the heads break off easily and shatter readily. Considerable variation exists in yield of these barley varieties. Hannchen and Gold have done well but are comparatively weak in the straw. Trebi, a six-rowed bearded sort, is becoming popular because of its consistently high yield.

FLAX

Six varieties of flax were seeded on May 21. Bison is a new variety and J.W.S. is a fibre flax. Good stands were obtained and plots were comparatively free from weeds.

TABLE 54.—FLAX—TEST OF VARIETIES, 1930

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		Commercial grade
					1930	Eight-year average	
			in.		bush.	bush.	
Bison	Sept. 2	102	19·5	10	15·2	.....	1 C.W.
Crown	" 3	103	19·3	10	15·1	12·1	"
Linota	" 4	104	19·7	10	11·7	.....	"
Novelty, Ottawa 53	" 7	107	20·0	10	11·4	11·1	2 C.W.
Premost	" 1	101	19·6	10	13·3	11·9	1 C.W.
J.W.S. (fibre)	Aug. 29	99	28·1	10	10·8	.....	1 C.W.

Attractive prices in relation to other grains caused an increase of flax to be sown in 1930. Of the three varieties tested for eight years, there is little difference in yield. Linota is resistant to wilt and Bison is resistant to both wilt and rust.

FORAGE CROPS*

The early part of the 1930 crop season was very dry. High winds, together with precipitation of less than one-third the average for the month of May, retarded normal growth. Biennial and perennial crops suffered and were in a backward condition by the beginning of June. Rainfall during the months of June and July was slightly over the average and well distributed. Good progress in growth was made after the middle of June and average yields were harvested for most classes of forage crops tested.

The major projects conducted under this heading consist chiefly of testing for yield, hardiness and drought resistance and varieties or strains which show possibilities under Northwestern Saskatchewan conditions. The experimental work includes tests with corn, sunflowers, roots, annual hay crops, grasses and legumes.

More than one weight is shown in the tables. The green weights represent the tonnage at time of cutting, but on account of the various kinds of forage crops differing so widely in amount of moisture when cut for hay, it is apparent that a constant basis is necessary for comparison. The absolute dry matter or water free matter of the material is used for this purpose. Samples are taken from all plots at time of cutting and oven-dried to a moisture free condition. The dry weight yields are then calculated from the percentage of dry matter. From the dry matter weights, the cured hay yields are calculated on the basis of twelve per cent of moisture. This percentage is the amount usually found in cured hay in this climate.

Most of the plots used for forage work are long and narrow. Seeding is done with an eight-foot drill. The length of the plots are so arranged that after removing the end borders, a six foot mower driven through the centre of the plot, cuts an area of one-hundredth of an acre. This method of eliminating borders has given quite good results. Border effect is usually quite pronounced under the conditions that prevail at this Station.

The work under forage crops is treated under three headings, Intertilled Crops, Annual Hay Crops and Perennial and Biennial Crops.

INTERTILLED CROPS

CORN

Nineteen varieties or strains of corn were tested for silage in 1930. The seed was sown with a corn planter in rows three feet apart during the last week in May. After the plants were well emerged, they were thinned out to 12 inches apart in the rows. The crop was harvested on September 2 following a frost of 10 degrees on the night of August 31. The data given in the following table represent the average from quadruplicate plots.

*Under the supervision of F. M. MacIsaac, B.S.A.

TABLE 55.—CORN—TEST OF VARIETIES FOR ENSILAGE
(Project Ag. 1)

Name of variety	Source of seed	Average height of plants	Yield per acre			
			1930 results		Six-year average 1925-30	
			Green weight	Dry matter	Green weight	Dry matter
		in.	tons	tons	tons	tons
Amber Flint	Wimple	43	3·18	0·53	4·09	0·59
Hybrid	Wimple	48	3·71	0·61	3·74	0·57
Quebec 28	McDonald College	42	3·88	0·65	3·69	0·52
Yellow Dent	Wimple	44	2·30	0·37	3·65	0·51
Northwestern Dent	Dak. Imp. Seed Co	47	2·64	0·45	3·40	0·48
90 Day White Dent	Dak. Imp. Seed Co	47	1·55	0·25	3·35	0·45
Northwestern Dent	Exp. Farm, Brandon	45	2·26	0·37	3·25	0·46
White Cap Yellow Dent	Steele Briggs	50	2·74	0·40	2·73	0·40
Longfellow	J. O. Duke	49	2·47	0·39	2·38	0·33
Bailey	J. O. Duke	47	2·45	0·38	2·05	0·27
Wisconsin No. 7	J. O. Duke	48	3·03	0·44	2·01	0·28
Golden Glow	J. O. Duke	50	2·11	0·30	1·94	0·25
Northwestern Dent	A. E. McKenzie	46	3·66	0·56	.....	.....
North Dakota White Flint	Steele Briggs	49	3·37	0·49	.....	.....
Pride Yellow Dent (Haney)	Dak. Imp. Seed Co	48	3·11	0·54	.....	.....
Minnesota No. 13	A. E. McKenzie	47	2·77	0·49	.....	.....
Minnesota No. 13	Dak. Imp. Seed Co	49	2·57	0·37	.....	.....
Comptons Early	J. O. Duke	47	2·55	0·38	.....	.....
Leaming No. 1	J. O. Duke	47	2·19	0·36	.....	.....

Corn has been a complete failure at this Station in two years out of the past six, 1925-30 inclusive. An average of twelve varieties tested is given for this period. In spite of a comparatively warm growing season and frequent showers in midsummer, yields of corn for 1930 were not above average. It should be noted that this average includes two years for which no crop was harvested. The highest dry matter yield for the 19 varieties tested this season was less than two-thirds of a ton, and only slightly over half a ton for the six-year average. Under the climatic conditions which prevail in this district, the growth of corn is very slow until the middle of July. Good progress is usually made after that date. On account of the short growing season and the susceptibility of this crop to frost, results have been a failure to relatively low yields under the most favourable conditions. Where ensilage is required, corn cannot be regarded as a dependable supply for this area.

SUNFLOWERS

Five varieties of sunflowers were seeded on summer-fallow on May 25. Methods of seeding and distance of plants apart in rows, were similar to those used for corn. Two of the varieties did not germinate and were reseeded. One of these, Mammoth Russian, produced a stand of seventy per cent from the second seeding, but the germination in the other variety was so low that it was not worth cutting. All varieties were harvested on September 2, due to a frost on the last night of August.

TABLE 56.—SUNFLOWERS—TEST OF VARIETIES
(Project Ag. 76)

Variety	Source of seed	Average height of plants	Stage of maturity at harvest	Yield per acre 1930	
				Green weight	Dry matter
		in.		tons	tons
Mammoth Russian	K. McDonald	63	Heads forming	10·38	1·87
Ottawa 76	Cen. Exp. Farm	60	Milk	7·87	1·40
Mennonite	Exp. Station, Rosthern	47	Firm dough	7·36	1·26
*Mammoth Russian	Dak. Imp. Seed Co	44	Heads forming	3·59	0·62

*Germination poor. Stand 70 per cent.

Mammoth Russian is a late vigorous growing variety. It produces a high green weight tonnage and a relatively high dry matter weight. Ottawa 76 is an earlier variety, although not equal in yield to Mammoth Russian, it usually reaches a more suitable stage for ensilage. Mennonite is a short growing early variety. In most years it will ripen seed at Scott, but its low yield does not favour it for silage. A comparison of the sunflower yields with corn for the same year, will show the former to be decidedly superior. Considerable silage is required each year for stock on the Station and sunflowers have always proved a dependable supply. Even in the driest years fair yields are obtained and this crop has never been a failure.

FIELD ROOTS

Thirty-one varieties of field roots were tested on summer-fallow in 1930. The seed was sown with a Planet Junior seeder in rows 3 feet apart on May 26. About two weeks after emergence, the plants were thinned to 12 inches apart in the rows for all varieties. The crop was harvested on September 30.

TABLE 57.—MANGELS—TEST OF VARIETIES
(Project No. Ag. 16)

Name of variety	Source of seed	Yield per acre			
		1930 results		Four-year average	
		Green weight	Dry matter	Green weight	Dry matter
		tons	tons	tons	tons
Yellow Eckendorfer	Gen. Swedish Co	14·78	1·58	8·35	0·87
Yellow Intermediate	Cen. Exp. Farm	13·73	1·97	7·81	1·11
Giant Long Red	A. E. McKenzie	15·08	1·85	7·80	0·98
Elvetham Mammoth	Hjalmar Hartmann	9·15	1·05	5·24	0·63
Red Eckendorfer	Gen. Swedish Co	13·28	1·56	.....	.....
Tarroje Barres	Hjalmar Hartmann	12·98	1·33	.....	.....
Prizetaker Yellow Globe	A. E. McKenzie	11·33	1·16	.....	.....

TABLE 58.—FALL TURNIPS—TEST OF VARIETIES

(Project No. Ag. 46)

Name of variety	Source of seed	Yield per acre			
		1930 results		Four-year average	
		Green weight	Dry matter	Green weight	Dry matter
		tons	tons	tons	tons
Early Six Weeks	Sutton	17·33	1·66	15·32	1·37
Purple Top Mammoth	Sutton	17·40	1·58	14·46	1·23
Greystone Devonshire	Steele Briggs	14·18	1·37	13·19	1·19
Pomeranian White Globe	Steele Briggs	14·25	1·36	12·96	1·18
Purple Top Aberdeen	Sutton	14·55	1·50	12·00	1·17
Red Paragon	Sutton	14·18	1·38	12·61	1·14
Hardy Green Round	Sutton	15·98	1·50	12·15	1·13
Purple Top Mammoth	Steele Briggs	15·98	1·43	12·83	1·12
White Globe	Ewing	14·33	1·27	12·00	1·05
Green Top Yellow Aberdeen	Ewing	12·00	1·31	9·64	1·05
Superlative Purple Top	A. E. McKenzie	17·40	2·34	.....	.....

TABLE 59—SWEDES—TEST OF VARIETIES

(Project Ag. 51)

Name of variety	Source of seed	Yield per acre			
		1930 results		Four-year average	
		Green weight	Dry matter	Green weight	Dry matter
		tons	tons	tons	tons
Bangholm	General Swedish Co	23·48	3·28	17·57	2·16
Improved Yellow Swedish	General Swedish Co	19·58	2·66	16·60	2·09
Olsgaard Bangholm	Hjalmar Hartmann	20·40	2·50	17·42	1·94
Bangholm	Experimental Farm, Kentville	21·08	3·11	14·24	1·91
Magnum Bonum	Ewing	18·45	2·47	13·64	1·68
Bangholm	Ewing	17·03	2·31	13·07	1·67
Bangholm	Experimental Farm, Nappan	15·15	2·08	12·81	1·59
Bangholm	A. E. McKenzie	19·35	2·36	13·05	1·58
Monarch	A. E. McKenzie	18·38	2·49	12·40	1·56
Bangholm (Klank)	Hjalmar Hartmann	19·20	2·75	.....	.....

TABLE 60—SUGAR BEETS—TEST OF VARIETIES

(Project No. Ag. 66)

Name of variety	Source of seed	Yield per acre 1930	
		Green weight	Dry matter
		tons	tons
Dippe	Dominion Sugar Co	13·20	3·13
Frederickson	Dominion Sugar Co	12·15	2·93
Rabbethge & Giessecke	Dominion Sugar Co	10·20	2·58

The 1930 season favoured the growth of root crops and all varieties yielded well above the average. Increases in yield were especially pronounced in the case of mangels and sugar beets. Good stands are usually procured with varieties of swedes and fall turnips, and reasonably good yields obtained. The

former generally excels the latter in yield. With mangels and sugar beets, germination is low and growth slow during the early part of the season, resulting in comparatively low yields. Unless the demand for this class of crop becomes greater, they are not likely to become popular in Northwestern Saskatchewan on account of the extra labour involved in producing them.

ANNUAL HAY CROPS

Annual hay crops continue to supply the large portion of cultivated forage used in Northwestern Saskatchewan. Various factors have contributed to their popularity. Compared with biennial and perennial crops, seed is cheap and easy to obtain. The average farm carries a sufficient line of machinery for its production. Annual crops produce returns in the same season as seeded. They are more dependable and usually give fair yields. Experiments conducted under this heading include dates of seeding oats for hay, varieties of oats for hay, comparison of annual hay crops and varieties of peas for hay.

TABLE 61—DATES OF SEEDING OATS FOR HAY

(Project No. Ag. 242)

Date	Yield per acre 1928–1930					
	Alaska			Banner		
	Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
	tons	tons	tons	tons	tons	tons
1st date	5·42	2·31	2·03	6·17	2·73	2·40
2nd "	4·29	1·98	1·74	5·91	2·68	2·36
3rd "	4·12	1·89	1·66	4·39	1·94	1·71
4th "	3·68	1·75	1·54	3·17	1·65	1·45
5th "	2·38	1·26	1·11	3·48	1·75	1·54
6th "	2·46	1·34	1·18	2·82	1·47	1·29
7th "	2·37	1·25	1·10	2·78	1·19	1·05

Oats for hay are not usually seeded until the major spring work is over. An experiment is in progress to determine how late oats can be seeded with the assurance of reasonable returns. An early and late variety are represented by Alaska and Banner respectively. The first seedings are made about May 24 and continued at weekly intervals until the first week in July. The highest yields were obtained from the late variety, represented by Banner, but Alaska can be sown a week to ten days later and avoid frost equally as well. The relative yields of the different dates vary from year to year depending on the amount of rainfall and the time of occurrence. An examination of the above table will show that oats for hay should be seeded as soon as possible after the rush of spring work is over.

TABLE 62—VARIETIES OF OATS FOR HAY
(Project No. Ag. 245)

Name of variety	Stage cut	Yield per acre					
		1930 results			Four-year average		
		Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
		tons	tons	tons	tons	tons	tons
Victory	Bloom	7·59	2·08	1·83	9·68	2·52	2·22
Banner	"	6·36	1·98	1·74	9·12	2·51	2·21
Gold Rain	"	8·31	2·26	1·99	9·39	2·48	2·18
Leader	"	7·68	2·11	1·86	9·41	2·36	2·08
Columbian	"	6·72	1·91	1·68	8·64	2·25	1·98
Longfellow	"	7·98	2·25	1·98	8·25	2·13	1·87
Liberty	"	5·97	1·30	1·14	6·75	1·51	1·33
Daubeney	"	4·95	1·18	1·04	6·01	1·38	1·21
Alaska	"	4·65	0·94	0·83	5·07	1·16	1·02
Gold Rain	Milk	6·48	2·34	2·06	7·93	2·66	2·34
Victory	"	6·12	2·39	2·10	7·34	2·59	2·28
Banner	"	5·43	2·06	1·81	7·40	2·45	2·16
Leader	"	5·58	2·24	1·97	6·99	2·42	2·13
Columbian	"	5·37	2·16	1·90	6·74	2·40	2·11
Longfellow	"	6·09	2·22	1·95	6·67	2·34	2·06
Alaska	"	6·69	2·26	1·99	6·85	2·30	2·02
Daubeney	"	4·32	1·53	1·35	6·24	2·13	1·87
Liberty	"	5·07	1·64	1·45	6·49	2·09	1·84
Columbian	Dough	4·74	2·44	2·15	5·80	2·98	2·62
Victory	"	4·98	2·51	2·21	6·06	2·89	2·54
Gold Rain	"	5·79	2·59	2·28	6·69	2·86	2·52
Banner	"	4·23	1·84	1·62	6·00	2·85	2·51
Longfellow	"	5·61	2·24	1·97	5·96	2·66	2·34
Leader	"	4·14	1·95	1·72	5·40	2·63	2·31
Daubeney	"	4·14	1·94	1·71	5·42	2·39	2·10
Alaska	"	4·95	1·98	1·74	5·24	2·36	2·08
Liberty	"	5·07	2·07	1·82	5·72	2·35	2·07

In this experiment, nine varieties of oats are used, representing early, medium early and late maturing varieties. These varieties are cut for hay at different stages of maturity, namely, bloom, milk and dough stages. The late maturing varieties have produced higher yields than the earlier sorts for each stage cut. Generally speaking, the yield of any variety increases as maturity advances. Oats cut in the dough stage contains less moisture than in the bloom stage and cures more readily.

TABLE 63—COMPARISON OF CROPS FOR ANNUAL HAY
(Project No. Ag. 246)

Crops	Rate of seeding per acre	Yield per acre					
		1930 results			Three-year average 1928–1930		
		Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
	lb.	tons	tons	tons	tons	tons	tons
Banner oats	70	5·54	2·49	2·19	5·41	2·45	2·16
Mackay peas	56						
Banner oats	85	4·87	2·16	1·90	4·96	2·19	1·93
Alaska oats	85	4·90	2·25	1·98	4·44	2·01	1·77
Feeder barley	96	5·53	1·85	1·63	4·94	1·77	1·56
Alaska oats	56	4·06	1·69	1·49	4·01	1·64	1·44
Chancellor peas	40						
Prolific spring rye	70	6·59	1·58	1·39	5·08	1·44	1·27
Hungarian millet	30	3·07	1·24	1·09	2·91	1·27	1·12
Siberian millet	30	2·62	1·17	1·03	2·94	1·18	1·04
Common millet	30	2·68	1·19	1·05	2·30	1·01	0·89

Nine kinds or combinations of annual hay crops were compared for forage in 1930. Banner oats and Mackay peas are late maturing varieties, while Alaska oats and Chancellor peas represent the early ripening varieties for these crops. A mixture of Banner and Mackay has out-yielded all other crops tested, both in 1930 and for the three-year average. The relative yields of oats seeded alone as compared with a combination of oats and peas, is not consistent and has varied from year to year. An average taken over a long period of years does not show a significant difference in yield. The seeding of peas with oats improves the palatability and feeding value of the crop. Feeder barley is an early maturing beardless variety from which fairly good yields have been obtained, but is not equal to oats. Spring rye commends itself as an annual hay crop, chiefly because of its earliness and adaptability to poor soils. Two cuttings are usually made in the one season. However, it is inferior to oats in yield and palatability of feed for live stock. Millets are a quick growing crop, but ample moisture and hot weather are required for best results. The cool climate of Northwestern Saskatchewan is not favourable to the growth of millets and the yields are influenced by the character of the season. The yields are low when compared with oats.

TABLE 64—VARIETIES OF PEAS FOR HAY

(Project No. Ag. 247)

Name of variety	Stage of maturity when cut	Yield per acre					
		1930 results			Four-year average		
		Green weight	Cured hay	Dry matter	Green weight	Cured hay	Dry matter
		tons	tons	tons	tons	tons	tons
Arthur, Ottawa 18	Pods formed	7·34	1·77	1·56	8·19	2·05	1·80
Mackay, Ottawa 25	"	8·54	1·92	1·69	8·25	1·97	1·73
Solo	"	8·58	2·07	1·82	8·14	1·85	1·63
Chancellor, Ottawa 26	"	7·86	1·82	1·60	7·92	1·65	1·45

In this experiment four varieties of peas were tested for hay. The crop was cut as soon as the plants were fully podded. In an average of four years, a medium late maturing variety has given the highest yield, while Chancellor, an early maturing sort, is lowest. Peas as a hay crop have some disadvantages. They are poor weed fighters. Where good stands are not produced at the start and followed by a steady vigorous growth, the crop becomes infested with weeds. Extension guards are required on the mower for cutting. Peas normally contain more moisture than oats, which makes them more difficult to cure. By seeding peas with oats, they can be more easily handled.

BIENNIAL AND PERENNIAL HAY CROPS

Previous experimental work with biennial and perennial hay crops has proved sweet clover to be the most dependable legume and Western rye grass to be the most satisfactory grass crop. Our experiments are therefore concentrated on these crops.

Fairly good stands of sweet clover were obtained this year when sown alone on summer-fallow, but where a nurse crop was used, the stands were reduced. The average stand of alfalfa sown on summer-fallow without a nurse crop was less than sixty per cent.

TABLE 65—METHODS OF SEEDING SWEET CLOVER
(Project No. Ag. 162)

Source	Depth of seeding	Seed treatment	Yield per acre Three-year average 1928–1930		
			Green weight	Cured hay	Dry matter
	in.		tons	tons	tons
Commercial	1½	Scarified	4·79	1·28	1·13
Scott	1½	"	6·26	1·59	1·40
Scott	¾	"	6·02	1·67	1·47
Scott	2¾	"	5·88	1·65	1·45
Scott	1½	Unscarified	5·80	1·61	1·42
Scott	1½	With pods on	4·93	1·49	1·31

In this experiment, different depths of seeding and scarified versus unscarified seed are compared. The average results for the three years, 1928-1930 inclusive, show that seeding 2¾ inches deep has given practically the same yield as where the depth is only ¾ of an inch. Similar results have been obtained where scarified seed is compared with unscarified, seeding 1½ inches deep. Even seeding sweet clover with the pods or hulls on has given a higher yield than commercial seed, but the crop was about a week later in blooming.

TABLE 66.—RATES OF SEEDING NURSE CROP WITH SWEET CLOVER
(Project No. Ag. 167)

Rate of seeding per acre		Yield per acre—three-year average						
		Nurse crop		Sweet clover following nurse crop		Average for sweet clover and nurse crop		
Sweet clover	Nurse crop	Green weight	Dry matter	Green weight	Dry matter	Green weight	Cured hay	Dry matter
lb.	bush.	tons	tons	tons	tons	tons	tons	tons
15	None					6·26	1·59	1·40
15	½	4·99	1·42	3·65	0·84	8·64	2·57	2·26
15	¾	5·42	1·54	3·48	0·81	8·90	2·67	2·35
15	1	6·11	1·85	3·26	0·77	9·37	2·98	2·62
15	1½	6·56	2·11	2·93	0·71	9·49	3·20	2·82

Rates of seeding a nurse crop with sweet clover and seeding without a nurse crop are compared in this project. An examination of the results will show that the yield of the nurse crop increases with the higher rates of seeding, and that the yield of sweet clover following the nurse crop decreases as the rate of seeding of the nurse crop is increased. Sweet clover sown alone has given almost twice the yield as when seeded with a nurse crop, but when the yield of clover and nurse crop are taken together, the returns are greater where the nurse crop is used. Seeding 15 pounds of sweet clover with a nurse crop of 1½ bushels of oats has given twice the yield of clover alone.

TABLE 67.—GRIMM ALFALFA—TEST OF STRAINS FOR YIELD
(Project No. Ag. 126)

Strain	Source	Yield per acre, 1930		
		Green weight	Cured hay	Dry matter
		tons	tons	tons
Grimm	Commercial	2·54	0·85	0·75
Grimm 666	University of Sask.	2·67	0·86	0·76
Grimm 451	University of Sask.	2·60	0·85	0·75
Grimm	Scott	2·03	0·75	0·66

Experiments with alfalfa have been conducted at this Station since 1914. Each year, plantings of the hardiest available varieties or strains are made on summer-fallow land, but the resulting crop is a failure two years out of three. The crop is seeded about the second week in June. Good stands are usually in evidence on all plots at the end of the first growing season, but by the following spring, the stands are invariably partially or completely winter-killed. The yields from alfalfa are low compared with those from sweet clover and the crop is not dependable under conditions existing close to this Station.

TABLE 68.—WESTERN RYE GRASS—TEST OF STRAINS FOR YIELD
(Project No. Ag. 221)

Strain number	Four-year average 1927-1930 yield per acre		
	Green weight	Cured hay	Dry matter
	tons	tons	tons
28	3·64	1·57	1·38
97	3·50	1·50	1·32
8	3·34	1·50	1·32
77	3·65	1·47	1·29
7	3·33	1·47	1·29
114	3·28	1·42	1·25
84	3·22	1·42	1·25
26	3·13	1·40	1·23
39	3·11	1·40	1·23
25	3·23	1·38	1·21
15	3·22	1·38	1·21
53	3·13	1·36	1·20
99	3·17	1·35	1·19
86	3·15	1·35	1·19
16	3·05	1·35	1·19
Commercial	3·07	1·33	1·17

Fifty-nine strains of Western rye grass are under test at this Station, but only those which are higher in yield than commercial seed are listed. A study of these grasses shows differences in habit of growth, colour of foliage, maturity and yield. None of these strains is available commercially, and it will be a few years before the test is completed.

POULTRY*

On December 1, 1930, the poultry at this Station consisted of 458 Barred Plymouth Rocks and 91 Bronze turkeys.

Sixteen Barred Plymouth Rock hens finished their first year with records of 250 eggs or over. The six highest records averaged 282 and the highest for the year was 301 eggs.

A pen of ten pullets was entered in the Saskatchewan Egg Laying Contest at Indian Head for the year of 1929-30. The pen received the highest number of points among all the Barred Rock pens in the contest, the first being taken by a pen of White Leghorns with a margin of 11 points. Four birds in the pen from this Station laid over the required 200 eggs to qualify for registration, totalling 983·9 points. Of the thirty Experimental Farm pens from seventeen Experimental Farms or Stations throughout Canada, the Scott pen stood third with 6·3 points less than the first. The No. 4 bird in the Scott pen was highest among all Experimental Farm birds in Canadian contests—including several breeds.

No hens with records below 190 eggs are retained for breeding at this Station. The flock was blood tested in January, 1930, for pullorum disease, with only one bird giving a doubtful test, and this bird was destroyed. Since these tests have been made annually, the mortality in young chicks has been very low. In 1930, hatching and brooding results were highly satisfactory. There were 1,156 chicks hatched from 1,736 eggs, or for each chick hatched, 1·5 eggs were required, which is a tie with the Morden Station for the lowest requirement at all the Dominion Farms and Stations.

FEEDING OF YOUNG CHICKS

This year a successful change was made in the feeding practice for young chicks. From the time the chicks were removed from the incubators on the 22nd day, a dry mash was kept before them in feeders and after ten days, cracked grain was fed in the litter twice daily. The dry mash consisted of one part each of bran, shorts, corn meal and sifted or hulless oat chop, 6 per cent fine meat scrap, 2 per cent each of fish meal, skim-milk powder and bone meal, ½ per cent of fine salt and 2 per cent cod liver oil. If an abundance of milk is available, the meat scrap, fish meal and milk powder may be omitted from the mixture, or if desired, 10 per cent meat scrap may be used, omitting fish meal and milk powder. Green feed in the form of sprouted oats is supplied until the chicks can get their own green feed outside. After the chicks are well started, the following mash is used in the self-feeders during the summer and whole grain is fed morning and evening:—

Bran, 100 pounds.
Shorts, 150 pounds.
Oat chop, 150 pounds.
Beef scrap, 50 pounds.
Fine salt, 2 pounds.

The feeding of laying stock remained the same as outlined in the annual report from this Station for 1929.

When the feeding experiments are closed at the 1st of May, surplus females are sold at reasonable prices to farmers desiring such stock. In the autumn the immediate demand for cockerels and pullets is supplied and the surplus is sold for table use. Hatching eggs are sold in the spring, but accommodation and equipment are not yet adequate for supplying day-old chicks to the public.

*Under the supervision of E. Van Nice, B.S.A.

EXPERIMENTAL FEEDING FOR WINTER EGG PRODUCTION

The experiments reported under this heading were started on November 1 and continued for a six-months' period each year they were in progress. Each pen consisted of twenty-five Barred Rock pullets.

HOME-MADE VS. HOME-GROWN MASH

The standard laying mash at this Station for a number of years has been what is termed the "home-grown mash." It is supplied in the hoppers before the hens winter and summer, and is made up of equal parts by weight of shorts, bran, barley chop, oat chop, and beef scrap. To each 100 pounds of the mixture one-quarter of a pound of fine salt and 2½ pounds of fine charcoal are added.

With a view to substituting feeds which must be purchased, a trial has been conducted for three six-month periods with an equal weight of wheat chop used to replace the bran and shorts. It is generally known that if an abundance of milk is always available, the beef scrap may be omitted, but in these tests the beef scrap was used in both lots.

TABLE 69—HOME-MADE VS. HOME-GROWN MASH (3-YEAR AVERAGE)

Data per bird	Total cost of feed	Eggs laid	Value of eggs	Feed cost per dozen	Returns over cost of feed
	$		$	cts.	$
Home-made mash	1 03	100	2 76	12	1 73
Home-grown mash	1 08	107	2 95	11	1 94

Since a three-year average shows a difference of 21 cents per bird in favour of the wheat chop replacing the bran and shorts, this should be a desirable ration for laying stock when the price of wheat per pound is below that of bran and shorts.

FISH MEAL VS. BEEF SCRAP

By reason of the frequent scarcity of milk and the greater convenience in feeding dry protein supplements, fish meal and beef scrap are the more common protein foods for laying pullets. These two supplements have been compared for three years.

TABLE 70—FISH-MEAL VS. BEEF SCRAP (3-YEAR AVERAGE)

Data per bird	Total cost of feed	Eggs laid	Value of eggs	Feed cost per dozen	Returns over cost of feed
	$		$	cts.	$
Fish meal	1 16	104	2 94	13	1 78
Beef scrap	1 03	100	2 76	12	1 73

The difference of 5 cents per bird, or $5 per 100 birds, shows fish meal to be slightly superior, but it is apparent that the difference in value as a protein supplement would not be as important a factor in deciding which to use as the comparative price on the market. There was no indication of the fish meal affecting the flavour of the eggs.

SKIM-MILK POWDER VS. BEEF SCRAP

In this test, by reason of the lower protein content of the milk powder, it was fed in sufficient quantity to make up the same amount of protein as sup-

plied by feeding one-fifth beef scrap in the other lot. The milk powder makes the mash more bulky, but it appears to be quite palatable.

TABLE 71—SKIM MILK POWDER VS. BEEF SCRAP (2-YEAR AVERAGE)

Data per bird	Total cost of feed	Eggs laid	Value of eggs	Feed cost per dozen	Returns over cost of feed
	$		$	cts.	$
Skim-milk powder	1 68	94	2 65	21	0 97
Beef scrap	1 14	101	2 77	13	1 63

The milk powder did not produce as many eggs as the beef scrap by seven eggs per bird, and the returns from this test to date appear to indicate beef scrap to be more suitable as a protein supplement for laying pullets.

GOLDEN WEST SHELL MAKER VS. OYSTER SHELL AND GRIT

Shell maker is supplied by a firm in the United States, which wishes to place shell maker on the Canadian market. It was valued in this test at $1.90 per 100 pounds, which was the price of the oyster shell and grit which it replaced.

TABLE 72—GOLDEN WEST SHELL MAKER VS. OYSTER SHELL AND GRIT (2-YEAR AVERAGE)

Data per bird	Total cost of feed	Eggs laid	Value of eggs	Feed cost per dozen	Returns over cost of feed
	$		$	cts.	$
Shell maker	1 10	97	2 74	13	1 64
Oyster shell and grit	1 14	101	2 77	13	1 63

The two-year test indicates that the shell maker has successfully replaced the oyster shell and grit. It appears that this product at the same price as oyster shell and grit would be satisfactory but could be more easily substituted without the knowledge of the purchaser.

CORN AS 20 PER CENT OF MASH AND SCRATCH GRAIN

Corn is known to be a valuable feed for poultry, but due to the distance it is shipped, the price sometimes appears prohibitive. In this test the corn was $3.10 per hundred.

TABLE 73—CORN AS 20 PER CENT OF MASH AND SCRATCH GRAIN (SINGLE TEST)

Data per bird	Total cost of feed	Eggs laid	Value of eggs	Feed cost per dozen	Returns over cost of feed
	$		$	cts.	$
Standard mash	1 06	102	2 98	12	1 92
Standard mash plus 20 per cent corn	1 27	115	3 35	13	2 08

In this single test, the corn has paid for itself and in addition, resulted in 16 cents profit per bird. In this experiment corn was an economical feed at $3.10 per hundred when used as 20 per cent of the ration. The experiment is being repeated during 1930-31.

ARTIFICIAL HEAT FOR LAYING PULLETS

In this trial sufficient heat has been supplied by use of a small stove in the house to prevent the water from freezing, but the temperature was not intentionally raised above 50 degrees Fahrenheit.

TABLE 74—ARTIFICIAL HEAT FOR LAYING HOUSE (3-YEAR AVERAGE)

Data per bird	Total cost of feed and fuel	Eggs laid	Value of eggs	Feed and fuel cost per dozen	Returns over cost of feed and fuel
	$		$	cts.	$
Heated house	1 31	106	3 05	15	1 74
Cold house	1 15	100	2 72	14	1 57

The average number of eggs laid and the returns over feed and fuel are in favour of the heated pen by $17 per hundred birds. The chief objection to heating with a stove is the danger from fire where litter is always present. If a poultryman had access to steam or electrical heat at low prices, it appears that a limited amount of heat would be beneficial in the climate of Northwestern Saskatchewan.

EGG WEIGHTS

From January 1 to the end of the experiment on April 30, the eggs were weighed from each pen and the average weight per dozen was as follows: Corn 23·9 ounces, check 24·1, home-grown mash 23·9, check for shell maker, milk powder and artificial heat experiments 23·6 ounces, milk powder 25·3, artificial heat 23·4 and shell maker 24·0 ounces. No conclusions can be drawn from these average weights taken from a single test of four months duration, but the egg weights are being taken from November 1, 1930.

TURKEYS

A flock of Bronze turkeys was started in 1929 from eggs obtained from five different prominent turkey breeders. Eight females and one male were retained for the 1930 breeding flock from which over 100 poults were hatched. The incubator and brooder were used, and the young poults, as well as the adult birds, were placed on fresh land where neither chickens nor turkeys had ever run before. For the most part, a five-foot wire was sufficient to keep the turkeys in the yard of approximately two acres. The young females seemed to be most inclined to get out but no serious trouble was experienced in this regard.

Trapnests for the laying season were built on the same plan as those used for chickens, details of which were shown in the annual report from this Station for 1928, the only difference being the larger scale and wire doors. These nests were built separately and placed at different parts of the yard and some in the house. The birds took to them quite readily and were very quiet to handle. By this means, exact records were kept of the breeding of the young birds for 1930, and one grade "A" hen which only laid two eggs, was eliminated. The first egg of the season was laid on March 28 and at the end of May five hens had laid 50 eggs each or over.

On November 25 the larger males weighed 28 pounds and the larger females weighed 19 pounds. Of the two hatches which came from the incubator May 8 and May 21, very little difference could be noted in comparing the birds of

different ages. This may be accounted for by the fact that due to the mild weather, the later hatch was able to get outside while younger.

The methods of feeding and the feeds used were practically the same as outlined in the 1929 report from this Station. The method employed in wintering, is to provide a building which is mostly open on the south.

Sunflowers make shade for growing turkeys.

Careful records have been kept of all feed used for turkeys and since they were confined to the yard, it is safe to say that they have received no other feed. The table shows in detail the feed used and the profits over feed and fuel alone.

TABLE 75—CASH STATEMENT FOR 1930—TURKEYS

Feed used in 12 months	Expenditures	Receipts
	$	$
Kerosene for incubator, 5 gals at 29 cents	1 45	
550 pounds coke, at $27 per ton	7 69	
105 pounds soft coal, at $6.50 per ton	0 38	
4,315 pounds mixed grain, at 1 cent per pound	43 15	
56 pounds charcoal, at 3·6 cents per pound	2 02	
170 pounds wheat, at 1·1 cents per pound	1 87	
122 pounds oyster shell, at 2·1 cents per pound	2 56	
209 pounds grit, at 1·9 cents per pound	3 97	
1,435 pounds mash, at 2·3 cents per pound	33 01	
543 pounds buttermilk, at 40 cents per hundred	2 17	
Oat, rape and sunflower seed	2 00	
Sales and Valuations		
Dressed turkey		80 42
Breeding stock		93 91
Hatching eggs		23 00
Surplus stock on hand, estimated dressed weight, 715 pounds, at 20 cents		143 00
Value over cost of feed	240 06	
	340 33	340 33

The breeding females totalled 8 birds at the beginning of the year and the same number of females have been omitted from this statement and will be used for breeding.

APICULTURE

The bees in the spring of 1930 consisted of 20 colonies wintered and 9 packages imported from Alabama. The first flight of outside bees was on March 11 with a second on March 18. On the latter date the weather was sufficiently mild to permit inspection and all colonies in wintering cases were in good condition with some brood present. As a means of stimulating brood rearing, a few cells of stores were uncapped in each hive, which practice was continued at regular intervals as considered necessary until the nectar flow started in the spring. Most of the overwintered colonies had five to six frames of brood before the package bees arrived on April 25, but due to cool weather and prolonged high winds during the early part of the season, these overwintered colonies had no opportunity to profit materially from the early brood rearing. As a result of the unfavourable weather during April and May, all colonies became short of stores early in June and on June 18 feeding was necessary. The sugar syrup used was made up of two parts water to one of granulated sugar, which is just the reverse of the mixture used in feeding for winter.

The latter part of June and the month of July was more favourable for the gathering of nectar and the bees were able to make full use of the sweet clover and alfalfa when the bloom was at its best. The highest yield for one colony in one day was 8½ pounds on July 30, and the highest yield for one colony for the season was 122½ pounds.

The general quality of honey stored in 1930 was superior to that of 1929. This may be due to more plentiful moisture improving the quality of nectar.

PACKAGE BEES

On April 25 six two-pound packages and three three-pound packages arrived from Alabama in excellent condition. Three packages of each size were placed in hives alone and three two-pound packages were used for an experiment in strengthening weak colonies. One colony was treated on July 12 to prevent swarming and another on July 21. The total extracted honey obtained from the three three-pound packages was 276½ pounds, and from the three two-pound packages 340 pounds. This result is not consistent with tests of previous years. The total yield of extracted honey for a three-year period from two-pound packages is 443 pounds and from an equal number of three-pound packages 548 pounds. In the light of the experience at this Station, it seems that two-pound packages are to be recommended as three-pound packages cost more and seldom give greater returns.

For methods of releasing package bees, the reader is referred to the annual report from this Station for 1928, and for general information concerning package bees, to pamphlet 107 New Series. Either publication may be obtained upon application to this Station or the Publications Branch, Department of Agriculture, Ottawa.

PACKAGE BEES FOR STRENGTHENING COLONIES

In this experiment, overwintered colonies are reduced to 2½-3 and 3½ frames of bees and to each of these a two-pound package is added, leaving another of equal strength as a check in order to determine what is gained by adding the packages.

TABLE 76—TOTAL EXTRACTED HONEY FROM FOUR TESTS, 1927–1930

—	Strengthened	Not strengthened
	lb.	lb.
2½ frame colonies	205	97
3 frame colonies	319	79
3½ frame colonies	244	139
Totals	768	315

The difference in production on a four-year average indicates that weak colonies should be either strengthened or united. Weak colonies seldom store sufficient honey to make the owner a profit, and are more apt to perish in winter.

METHODS OF DETECTING PREPARATIONS FOR SWARMING

Perhaps the method involving the least work in detecting preparations for swarming is the use of the double brood chamber. This is a half or full depth super above the regular brood chamber with the queen excluder above, thus giving the queen the run of both. With a good strong colony a full depth super is used above, thus allowing the interchanging of frames from above and below in manipulating to stimulate brood production. In either case, the procedure is to tip the top super from the back, inject a little smoke and raise high enough for a careful inspection of the bottom bars of the frames. If there are no queen cells found here it is safe to assume that the colony is not preparing to swarm. This saves a great deal of time in searching for queen cells. If queen cells are found on the bottom bars of the top super, treatment for swarming is usually necessary. When using a double brood chamber at this Station, any queen cells found in the lower brood chamber have been left untouched and have always proved to be supersedure cells. However, if signs of a failing queen are noted, she should be replaced at once as valuable time is lost in brood raising if the bees are left to supersede failing queens.

TREATMENT FOR SWARMING

On occasions when there is plenty of room in the hive for brood rearing and storing of honey, and the colony shows signs of swarming under normal conditions, some treatment is needed. The treatment preferred at this Station is to de-queen and re-queen. The method of procedure is to remove the old queen as soon as the colony shows a desire to swarm by building queen cells, place all brood above the honey supers and fill the brood chamber with drawn comb containing a small quantity of stores. The young laying queen is at once introduced by the use of a "push in" cage placed on some uncapped stores in the brood chamber. Care is taken to destroy all queen cells and again 10 days later. This treatment has been employed at this Station for a number of years and has been entirely satisfactory.

WINTERING

On October 28, 1929, ten colonies were placed in winter packing cases. The packing used was chaff in some cases and mill shavings in others. The thickness varied from six to ten inches in different cases. The six-inch packing seems adequate for the sides but for the top, from eight to ten inches is desirable on account of the moisture to be absorbed from the colony and the circulation of air above. One point essential to successful wintering is an

effective wind-break near the wintering cases. Since this is important in summer as well as in winter, the location of the apiary should be such that a wind-break is provided permanently. For the winter of 1929-30 and the previous winter, attempts were made to winter bees in a cavity burrowed in a straw pile, the opening being closed after the bees were put in. In view of the fact that this resulted in a loss of a colony each year, and that it requires more labour than preparing wintering cases or placing colonies in the cellar, the practice is not considered practical.

The wintering in cases outside and cellar wintering, both gave excellent results during the winter of 1929-30.

FEEDING FOR WINTER

In feeding for winter, sugar syrup has been used each year as soon as the honey supers have been removed. The method of preparation has been to heat ten gallons of water to boiling and add 200 pounds of pure white granulated sugar. Immediate stirring was necessary to avoid burning and the heat was continued until the sugar was thoroughly dissolved and the solution became clear. At this point the fire was withdrawn and the syrup fed warm through ten-pound honey pails with perforated lids. These were inverted on the top of the frames and protected from other bees by an extra super. Weak colonies were united and each colony was fed until the brood chamber without cover, weighed from 70 to 75 pounds. Surplus queens were wintered successfully—two in a hive, by using a bee tight division board in a regular brood chamber.

A number of queens have been raised each year at this Station but the practice is not recommended to the average beekeeper.

Annual visit of the Paynton Agricultural Society.

EXTENSION AND PUBLICITY

Letters received and despatched in 1930 totalled 9,340. An increase of 331 letters received in excess of the previous year was recorded. Of this increase, 271 were in the last four months of the year. In order of numbers, the subjects showing the largest increases were commercial fertilizers, poultry, hogs, cattle, sheep and swine. The low grain prices prevailing in the latter part of the year undoubtedly were responsible for the increase of enquiries on live stock. Classified records of incoming mail at an experimental station, indicate what the farmers are thinking about and, to some extent, serve as an index of possible changes in agricultural practice.

During the summer, organized parties held agricultural field days at this Station from as far north as Paynton, Sask., as far south as Brock, Sask., as far east as Biggar, Sask., and as far west as Hayter, Alta. Operators of Illustration Stations supervised from this Station, held a conference here on July 17. Another special group, consisting of boys, was present for the express purpose of assistance in judging field crops. When weather permitted, persons came every day for interviews and to see experimental work. It is always a pleasure to arrange a date for organized agricultural parties to visit the Station.

Members of the staff assisted in judging at agricultural fairs held in Wilkie, Unity, Kelfield, Cut Knife, Landis, North Battleford and Luseland. An educational exhibit was displayed at six class C fairs in the territory served by this Station, namely, Macklin, Lashburn, Turtleford, Cut Knife, Luseland and Kitscoty.

Apart from correspondence, visits to the Station and agricultural fairs as mentioned, additional extension work was carried on with co-operative tests of grain varieties and fertilizer demonstrations as outlined in the cereal and field husbandry sections of this report.

OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1931.