DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

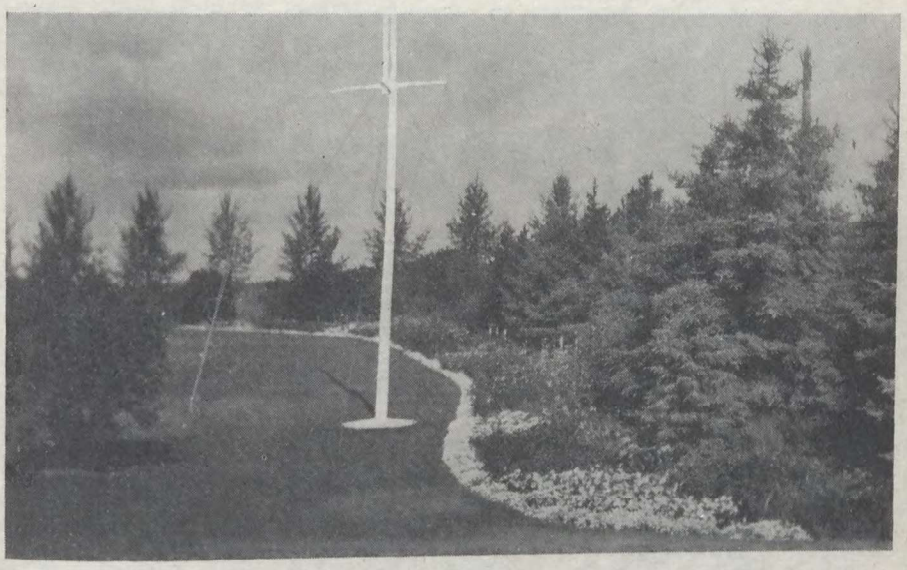
EXPERIMENTAL STATION

ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT

W. A. MUNRO, B.A., B.S.A.

FOR THE YEAR 1928



Part of the annual flower border.

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DOMINION EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

SEASONAL NOTES

The season of 1928 was peculiar in having a low total precipitation in spring and fall but a high precipitation at the time that counted most in plant growth The total for April and May was 0·6 inch; for June, July, and August, 7·86 inches; and for September and October, 0·92 inch. The result was a higher than average yield of pasture, hay, and grain, and almost ideal weather for seeding and harvest. One effect of the dry spring was the slow germination of weed seeds and especially of wild oats, enabling them to survive spring cultivation and appear unusually plentiful in the late-sown grain crops. Wild oats were unusually bad also in the early-sown wheat on summer-fallow, which seems to be explained by the greater depth of warm dry soil, permitting wild oats, from a greater depth than ever before, to germinate.

The dry autumn allowed threshing to be completed in almost all cases before the end of September.

Frosts on August 23, 24, and 25 and more severe frosts on September 8, 9, and 10 ruined late-sown grain crops and late varieties of grain crops throughout the province. The great economic value of the early varieties of wheat, bred and developed by Dr. Charles Saunders was never so apparent as in 1928.

METEOROLOGICAL RECORDS AT ROSTHERN—1928

Month	Temperature F.				Precipitation				Evaporation
			Mean						
	Highest	Lowest	1928.	18-year average 1911–1928	Rain	Snow	Total precipitation 1928	18-year average 1911–1928	1928
	°	°	°	°	in.	in.	in.	in.	in.
January	43·1	−41·5	7·2	−2·5	.....	0·5	0·05	0·74	.....
February	41·2	−21·0	13·0	2·6	.....	0·5	0·05	0·43	.....
March	62·3	−16·0	22·3	14·5	.....	5·0	0·50	0·61	.....
April	77·0	1·0	31·9	37·0	.....	2·0	0·20	0·88	.....
May	93·3	24·0	56·4	50·5	...0·40	.....	0·40	1·62	5·26
June	86·2	35·9	56·7	59·2	2·57	.....	2·57	2·22	3·52
July	88·0	42·5	64·8	63·5	4·26	.....	4·26	2·78	3·88
August	92·5	32·5	58·6	60·7	1·03	.....	1·03	1·91	4·43
September	83·1	17·7	50·3	50·3	0·28	.....	0·28	1·58	2·58
October	66·5	12·2	36·6	37·5	0·64	.....	0·64	1·51	.....
November	46·0	4·1	26·8	20·6	.....	.....	.....	0·56	.....
December	39·4	−28·0	14·5	0·0	.....	1·5	0·15	0·53	.....
Totals	.....	.....	.....	.....	9·18	9·5	10·13	15·37	19·67

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ANIMAL HUSBANDRY

HORSES

The horses at this Station at the end of the year 1928 totalled twenty-three. Of these, fourteen were work-horses and three were brood mares. There were four Clydesdale yearling colts, one foal, and one driving and general purpose mare.

The four colts were weighed at birth and again when they reached the age of one year. The following table summarizes the results. A record of the feed eaten by the colts and the hay and grain fed to the mares while nursing the colts is included in the total cost of the feed for the period.

GROWTH AND FEEDING DATA OF COLTS

Number of animal	Weight at birth	Weight at age of 1 year	Total gain for period	Average daily gain	Total cost of feed for period	Cost of feed per day	Feed cost per 100 pounds gain
	lb.	lb.	lb.	lb.	$ cts.	cts.	$ cts.
1	126	906	780	2·14	48 18	13·20	6 17
2	130	846	716	1·96	48 18	13·20	6 73
3	130	852	722	1·98	47 52	13·02	6 58
4	118	866	748	2·05	43 56	11·93	5 82
Average	126	867·5	741·5	2·03	46 86	12·84	6 33

In estimating the cost of feed the following values were used:—

Bran	$30 00 per ton
Oats	0 40 per bushel
Hay	7 00 per ton
Pasture	2 00 per month

The variation in the cost of feed for the period is chiefly on account of the greater number of days that colts one and two nursed their dams.

CATTLE

THE HOLSTEIN-FRIESIAN HERD

At the end of the year 1928 the herd was made up of one aged bull, one yearling bull, five bull calves, fourteen mature cows, eight two-year-old heifers, one yearling heifer, and five heifer calves, making a total of thirty-five head.

The Holstein herd at this Station has developed into a very uniform herd both in type, production, and percentage butterfat. This may be attributed to the foundation of the herd, two individuals, Bonny View Gypsy Keyes and Mayflower Sylvia, and to the selection of herd sires for their type and the production records of their ancestors.

The herd sire, which has been in service during the past two years, was Agassiz King Pietje Canary. In November, 1928, this bull was entered in the Advanced Registration of Bulls and scored XX, which is the second highest standard of recognition for bulls. The calves in the herd by this sire are very promising individuals and conform very closely to the Holstein type desired by breeders.

The junior herd sire is Colony Wimple Sir Bessie No. 73928, bred by Colony Farms, Essondale, B.C. This bull was sired by Hazelwood Heilo Sir Bessie who was first prize two-year-old bull at the New Westminster show in

1927. The dam of the latter bull was a Gold Medal cow in Advanced Registry. At two years, four months, she produced 20,927 pounds of milk from which was produced 847·5 pounds of butter.

The sixteen cows in the herd were graded in Advanced Registry by the Western Fieldman for the Holstein-Friesian Association as follows: Two Gold Medal cows, two Excellent cows, and twelve Good cows. There were no cows in the herd which graded Fair or Poor.

Seven bull calves were sold at six months old to breeders in northern and central Saskatchewan. All but one of these calves went into grade Holstein and Shorthorn herds to increase production and to improve the type of the herds.

The Holstein-Friesian herd in November passed its eighth accreditation test.

This year a blood sample was taken from each individual in the herd by a qualified veterinarian and the blood samples were forwarded by him to the animal pathologist at Lethbridge for examination and the serum reactions were all reported as negative. This examination was made for bacillus abortus of bang, the causal organism of contagious abortion.

MILK RECORDS

In the accompanying table is a statement of the production of each of the five cows ending their lactation period within the calendar year 1928, together with the amount of feed consumed, the cost of milk production, and profit from each cow.

The profit column shows a comparison only between the cost of feed and the value of milk produced. The cost of labour, the interest on the investment, and the value of the calf at birth are not included in this statement of production. In estimating the cost of feed the following values were used:—

Bran	$19 00 per ton
Meal	34 60 "
Corn ensilage	3 00 "
Swede turnips	1 00 "
Hay	9 00 "
Pasture	2 00 per month

The meal mixture is composed of:—

300 pounds of bran
300 " oat chop
150 " barley chop
200 " oil cake meal

The meal mixture was figured on the prices charged at the local elevators.

Dairy Herd Production

Name of animal	Number of lactation period	Number of days in milk	Total milk for period	Daily average yield of milk	Average per cent fat in milk	Butter produced in period	Value of butter at 40 cents per pound	Value of skimmilk at 20 cents per cwt.	Total value of product
			lb.	lb.	%	lb.	$	$	$
Rosthern Pietje Marcelle 124302	2	290	8,082·9	27·87	3·9	373·84	149 54	15 57	165 11
R. E. S. Johanna Sylvia 68179	6	359	13,008·0	36·23	4·1	617·88	247 15	25 03	272 18
Rosthern Mechthilde Lass 104426	3	313	17,772·3	56·78	3·5	733·11	293 24	34 37	327 61
Rosthern Pietje Rebecca 111762	2	332	12,209·3	36·78	4·0	579·94	231 98	23 49	255 47
Rosthern Inferno Miriam 138549	1	305	7,693·7	25·23	4·6	413·54	165 42	14 73	180 15
Total		1,599	58,766·2			2,718·31	1,087 33	113 19	1,200 52
Average		319·8	11,753·24	36·75	3·9	543·66	217 47	22 64	240 10

Feed Consumption and Profit

Name of animal	Amount of meal eaten	Roots eaten	Ensilage eaten	Amount hay consumed	Months on pasture $2 per month	Total cost of feed between calvings	Cost to produce 100 pounds milk	Cost to produce 1 pound butter	Profit on 1 pound butter, skim-milk neglected	Profit on cows between calvings labour and calf neglected
	lb.	lb.	lb.	lb.		$	$	cts.	cts.	$
Rosthern Pietje Marcelle 124302	2,662·5	5,249	5,990	3,903	4	85 48	1 06	23	17	79 63
Bran	46·5									
R. E. S. Johanna Sylvia 68179	3,420·0	6,150	7,565	3,856	4	100 79	0 77	16	24	171 44
Rosthern Mechthilde Lass 104426	4,011·0	4,319	5,640	3,891	4	107 47	0 60	15	25	220 15
Bran	45·0									
Rosthern Pietje Rebecca 111762	3,534·0	4,604	5,700	3,363	4	96 79	0 79	17	23	158 68
Bran	20·0									
Rosthern Inferno Miriam 138549	2,289·5	4,475	5,449	3,917	4	77 14	1 00	19	21	103 02
Bran	10·5									
Total						467 60				732 92
Average						93 52	0 80	17	23	146 58

The average feed cost to produce one hundred pounds of milk at this Station during the last three years has been 85 cents in 1926, 72·93 cents in 1927, and 84·6 cents in 1928, averaging 80·84 cents for the three years.

The daily average yield of milk in 1926 was 29·72 pounds; in 1927, 34·77 pounds; and in 1928, 36·58 pounds.

The average percentage of fat in the milk in 1926 was 3·76; in 1927, 3·73; and in 1928, 3·78 per cent.

CALF FEEDING EXPERIMENTS

An experiment for the purpose of comparing the value of new milk, skim-milk, and one-half new milk with one-half skim-milk for feeding dairy bull calves from the age of four months to the age of six months was carried on at this Station. The three calves selected for this experiment were all well-grown individuals, kept under similar conditions before and throughout the experiment. The calves were weighed at the beginning of the experiment and again after fifty-four days. No. 1 calf received 20 pounds of skim-milk and 3 pounds of chop per day. No. 2 calf received 10 pounds of new milk, 10 pounds of skim-milk and 3 pounds of chop per day. No. 3 calf received 20 pounds of new milk and 3 pounds of chop per day.

The meal mixture consisted of the following: 300 pounds of bran, 300 pounds of oat chop, 150 pounds of barley chop, 200 pounds of oil cake meal.

The following table summarizes the results obtained:—

CALF FEEDING EXPERIMENT—DURATION FIFTY-FOUR DAYS

Calf	Initial weight	Final weight	Gain	Average daily gain	Feed		Total cost of feed		Amount of feed required for 1 pound gain		Cost of 1 pound gain
					New milk	Skim-milk					
	lb.	lb.	lb.	lb.	lb.	lb.		$	lb.	cts.	cts.
No. 1	416	600	184	3·41	.....	1,080	Skim-milk	1 08	5·87	0·59	2·11
							Meal	2 80	0·88	1·52	
							Total	3 88	.....	2·11	
No. 2	380	575	195	3·61	540	540	New milk	10 80	2·77	5·54	7·25
							Skim-milk	0 54	2·77	0·28	
							Meal	2 80	0·83	1·44	
							Total	14 14	.....	7·25	
No. 3	368	542	174	3·22	1,080	.....	New milk	21 60	6·21	12·41	14·02
							Meal	2 80	0·93	1·61	
							Total	24 40	.....	14·02	

In estimating the cost of feed the following values were used:—

Skim-milk 0·1 cent per pound.
Whole milk 2 cents per pound.

The variation in individual daily gains was very slight, but the variation in the cost to produce one pound gain was wide. New milk was the most expensive feed, producing gains, with the chop, at a feed cost of 14 cents per pound gain. New milk and skim-milk, together with the chop, produced gains at a feed cost of 7 cents per pound. Skim-milk only, with the chop, produced gains at a feed cost of 2 cents per pound.

Three heifer calves were fed in the same way as the bull calves recorded in the above table, except that No. 1 calf received 18 pounds of skim-milk per day with the chop and 22 pounds of flax during the period. No. 2 calf received 18

pounds of new milk with the chop per day and No. 3 calf received 6 pounds of new milk and 12 pounds of skim-milk per day with the chop. The following table summarizes the results:—

EXPERIMENTAL FEEDING OF HEIFER CALVES—FIFTY-FOUR DAYS DURATION

Calf	Initial weight	Final weight	Gain	Average daily gain	Feed			Total cost of feed		Amount of feed required for 1 pound gain		Cost of 1 pound gain
					New milk	Skim-milk	Flax					
	lb.	lb.	lb.	lb.	lb.	lb.	lb.		$	lb.	cts.	cts.
No. 1	324	456	132	2·44	.....	828	22	Skim-milk....	0·828	6·27	0·63	2·93
								Meal.....	2·387	1·05	1·82	
								Flax.....	0·648	0·17	0·50	
								Total.....	3·863	.....	2·93	
No. 2	276	422	146	2·70	828	.....	.....	New milk....	16·56	5·67	11·34	12·98
								Meal.....	2·387	0·95	1·64	
								Total.....	18·947	.....	12·98	
No. 3	240	410	170	3·15	276	552	.....	New milk....	5·52	1·62	3·24	4·97
								Skim-milk....	0·552	3·25	0·33	
								Meal.....	2·387	0·81	1·40	
								Total.....	8·459	.....	4·93	

In estimating the cost of feed the following values were used:—

Skim-milk, 0.1 cent per pound.
New milk, 2 cents per pound.
Flax, $1.65 per bushel.

As in the case of the bull calves, the variation in daily gains was slight and the variation in the cost of feed per pound gain was wide. New milk fed with the chop produced gains at a feed cost of 13 cents per pound. Skim-milk with flax seed jelly and chop produced gains at a feed cost of 3 cents per pound. New milk and skim-milk together with the chop produced gains at a feed cost of 5 cents per pound.

NOTE.—To make the flax seed jelly, six pounds of flax were soaked in water and heated. Water was added until a thin jelly was formed. This jelly was allowed to cool and $\frac{1}{3}$ of a cupful added to 10 pounds of skim-milk. The amount was gradually increased to one cupful.

The following table shows a comparison of gains made by dairy calves on various feeds from birth until six months of age.

The calves were all weighed at birth and again at the age of six months. The feed given during this period was weighed each day and the weights recorded.

GAINS AND FEED CONSUMPTION OF CALVES

Calf	Date of birth	Weight at birth	Weight at six months	Sex	Average daily gain for period	Amount of new milk fed	Amount of skim-milk fed	Amount of meal fed	Amount of hay fed	Amount of roots fed	Amount of silage fed	Total cost of feed	Cost of feed for 1 lb. gain
		lb.	lb.		lb.	lb.	lb.	lb.	lb.	lb.	lb.	$	cts.
1	Aug. 14, 1927	75	528	Male	2·46	964	1,578·5	158	555	1,270	878	28 43	6·3
2	Feb. 2, 1928	95	600	Male	2·76	1,661·5	1,229	213·5	197	.....	.....	39 04	7·7
3	Feb. 24, 1928	106	612	Male	2·76	1,831	1,522	269	188	.....	.....	43 64	8·6
4	Mar. 3, 1928	97	592	Male	2·68	2,794	680	255	125	.....	.....	61 54	12·4
5	Mar. 5, 1928	110	620	Male	2·76	2,062	1,051	305	141	.....	.....	48 20	9·5
6	April 21, 1928	92	600	Male	2·76	2,259	812	277	6	126	63	51 00	10·0
7	May 16, 1928	90	590	Male	2·70	2,353	908	351·5	188	282	.....	55 22	11·0
8	June 6, 1928	100	576	Male	2·59	1,921	1,128	387·5	193	402	144	47 66	10·0
9	Mar. 18, 1928	92	501	Female	2·21	1,521	1,407	245·9	167	.....	.....	36 83	9·0
10	April 10, 1928	114	554	Female	1·85	2,457	576	277	83	60	.....	54 93	12·5
11	April 29, 1928	92	551	Female	2·49	1,415	1,324	358	.....	174	.....	35 96	7·8
	Total	1,063	6,324	.....	.....	.....	.....	.....	.....	.....	.....	502 45	
	Average	96·6	574·9	.....	2·55	.....	.....	.....	.....	.....	.....	45 68	9·6

New milk accounts for the higher cost of feed for one pound gain in the case of individuals Nos. 4, 6, 7, and 10. The average daily gains made by the bull calves during the six months show very small variation.

The average daily gain made by the bull calves was 2·68 pounds and by the heifer calves 2·18 pounds, showing a difference in the average daily gain of 0·5 pounds in favour of the bull calves.

The average cost of feed to produce one pound gain for all calves during the period was 9·55 cents.

SWEET CLOVER ENSILAGE

Sweet clover sheaves were packed in a trench silo and tramped well and covered over with slough hay in June. This was left until the month of March when the trench silo was opened. On examination of the ensilage it was found that from the sides, top, and bottom moulds had formed and destroyed the food value of about seventy-five per cent of the sweet clover. The remainder was well preserved and was fed to the dairy cows and heifers. They preferred this to the corn ensilage but the loss through moulds and the expense and labour of removing it made this method of preserving sweet clover unprofitable.

SHEEP

The number of sheep at this Station at the end of the year 1928 was sixty-three, which comprised one pure-bred aged Leicester ram, one pure-bred Suffolk two-shear ram, one pure-bred Suffolk shearling ram, four pure-bred Suffolk ewes, and one pure-bred Suffolk ewe lamb. The remainder was made up of forty-five graded-up Leicester ewes and ten Leicester lambs.

The number of lambs born in the spring of 1928 was thirty-nine males and twenty-nine females. The number of lambs raised to market weight was forty-three. There were three sets of triplets, seventeen sets of twins, and thirty-five single lambs.

The average weight of the males at birth was 9·4 pounds and of the females 7·53 pounds.

The lambs were born from February 2 to April 22, 1928. The February and March lambs were strong and healthy and the mortality was very low. The April lambs were not as strong at birth and the mortality was high.

Only three lambs showed symptoms of goitre at birth; of these one recovered and two died.

The mortality among the ewes at lambing time was two, due in both cases to expulsion of the uterus.

All the ewes received potassium iodide mixed in the proportion of one ounce of potassium iodide to one gallon of water and fed at the rate of one tablespoonful per ewe per day in the meal mixture.

Sweet clover hay was fed to the ewes during the fall of 1927 and the winter of 1928. The ewes relished this hay, and while it was being fed only one-quarter to one-half of a pound of grain was fed per ewe per day until two weeks previous to lambing time, when the grain allowance was increased to three-quarters of a pound per ewe per day. The condition of the ewes at lambing time was excellent.

The cross-bred Suffolk-Leicester lambs made more rapid gains to market weight than the Leicester lambs and in the grading of the carcasses on the rail the Suffolk-Leicesters showed more finish and a fuller leg of mutton.

The average weight of the Suffolk fleeces was 8·81 pounds; of the Leicester fleeces, 9·82 pounds; and of the Suffolk-Leicester cross fleeces, 10·1 pounds.

FLUSHING EWES ON DIFFERENT PASTURES FOR INCREASED LAMB PRODUCTION

In the fall of 1927 the ewes were divided into three groups. One lot of twelve ewes was given access to a field of alfalfa aftermath for two months previous to the breeding season. Lot No. 2 had access to sweet clover. Lot No. 3 access to a bare stubble pasture. The ewes were housed in the same way and fed the same ration during the winter months. The twelve ewes in lot No. 1 had twenty-three lambs weighing 187 pounds at birth, or an average weight of 8·1 pounds. Of these, fourteen were twins, six triplets, and three single lambs. There was one weak lamb in this lot which died within twenty-four hours. The twelve ewes in lot No. 2 had nineteen strong, healthy lambs weighing 169·5 pounds, or an average of 8·9 pounds. There were three triplets, ten twins, and six single lambs in this lot. The ewes in lot No. 3 had fifteen lambs weighing 130 pounds, or an average of 8·6 pounds. There were six twins and nine single lambs in this lot. Three of these lambs were dead at birth.

The results of this experiment go to show the importance of flushing ewes previous to the breeding season.

SWINE

The number of hogs at this Station at the end of the year 1928 was one hundred and five, of which forty-nine were Yorkshires, seven were Tamworths, one a Berkshire, and the remainder Yorkshire-Tamworth cross-breds.

The total number of pigs farrowed during the year was one hundred and seventy-three. There were nine Yorkshire litters with a total of eight-five pigs, giving an average of 9·44 pigs to a litter. Two pigs only were dead at birth. The average weight of the pigs at birth was 2·7 pounds. There were five Tamworth litters with a total of thirty-eight pigs, of which two were dead at birth. The average number of pigs to a litter was 7·6, averaging in weight 2·47 pounds. There were five Berkshire litters with a total of fifty pigs, of which two were dead at birth. The average number of pigs to a litter was ten, averaging in weight 2·52 pounds.

Six of the Yorkshire sows farrowed for the first time, while all the other sows had had at least three litters.

Since the Yorkshire breed conforms more closely to market requirements than any other breed, this Station aims to breed solely Yorkshire swine in the future, and to make a comprehensive study of the families and strains within the breed, as to the number of days required to develop feeder pigs from birth to market weight, the quality of carcass produced, and the cost of production.

Among important additions made to the Yorkshire herd at the Station during the past year are the boar King W. H. F. 242 —122625—, four gilts from the Central Experimental Farm at Ottawa, one gilt from the Experimental Station at Lacombe, two gilts from the Institutional Farms at Regina, and one gilt from Mr. W. B. Weightman, Simpson, Sask. The boar King was selected not alone on his good type for the breed but also for his proven ability to sire large uniform litters.

It is the intention of the Station to assist swine breeders as far as possible to improve their herds. In order to do this the best six boar pigs were selected from three litters and sold to breeders in this district, and in the year 1929 pure-bred Yorkshire boar pigs and gilts will be selected for sale to breeders.

In order to have the necessary accommodation for farrowing sows in the early spring an extension has been added to the piggery, affording twelve farrowing pens instead of six. This addition has a slatted ceiling and straw loft extending its entire length. The brood sows have colony houses for sleeping quarters. They are fed at the piggery and the colony houses are at a sufficient distance from this to ensure the sows having ample exercise by going to the piggery for their food.

During the gestation period the sows receive one tablespoonful of potassium iodide solution in the meal mixture daily to ensure against hairlessness in the litters. The strength of this solution is one ounce of potassium iodide to one gallon of water. Nema capsules are given to the young pigs from weaning time at monthly intervals as a preventive against intestinal parasites.

The experimental work during the year has been directed to ascertain the comparative values of various pastures for feeding hogs, the comparative costs and efficiency of methods of feeding, the practicability of the proposed policy of Advanced Registry for Swine, and the comparative values of frozen wheat and barley chop for finishing hogs.

RAPE VERSUS RYE PASTURE FOR MARKET HOGS

On one pasture lot of three-quarters of an acre nine pounds of rape were sown in the month of June. On a similar lot of three-quarters of an acre adjoining, sixty-three pounds of rye were sown in May. Sixteen pigs were divided into two lots of eight, and these lots were almost identical as to breeding, weight, and thrift. One of these lots was kept on the rape pasture and the other on the rye pasture during the months of July, August, September, and October for the purpose of establishing a comparison between the values of the two pastures as supplements to a grain ration.

The pigs were weighed individually at weekly intervals during the test. Both lots were fed the same quantity of meal and tankage throughout the experiment and had access to a mineral mixture composed of the following: 100 pounds of coal dust, 2 quarts of air-slaked lime, 10 pounds of bone meal, 2 pounds of sulphur.

A summary of the results of this experiment is as follows:—

COMPARISON OF GAINS AND COSTS OF HOGS ON RAPE AND RYE PASTURES

Pasture	Number of hogs in lot	Total initial weight	Average initial weight	Total finished weight	Average finished weight	Total gain	Average gain per hog	Number of days on test	Average daily gain per hog	Total meal consumed	Total tankage consumed	Meal consumed per pound gain	Tankage consumed per pound gain	Total cost of feed	Cost of feed per hog per day	Cost of feed per pound gain
		lb.	lb.	lb.	lb.	lb.	lb.		lb.	lb.	lb.	lb.	lb.	$	cts.	cts.
Rape	8	494·5	61·8	1,403·5	175·44	909	113·6	105	1·08	3,731·5	324·5	4·11	0·36	56 42	6·7	6·2
Rye	8	494·5	61·8	1,426·5	178·31	932	116·5	105	1·11	3,731·5	324·5	4·00	0·35	56 42	6·7	6·2

The results indicate that the difference in value of the two pastures is very slight. The pigs on the rape pasture, however, suffered from sunscald for a period of two weeks at the end of August, and difficulty with sunscalding would appear to be the disadvantage of this pasture.

ADVANCED REGISTRATION OF SWINE

During the year 1928 four litters of pure-bred Yorkshire swine were set aside exclusively for experimental work in connection with the proposed policy of the Dominion Government for the Advanced Registration of Swine.

For those who are not familiar with the outline of this policy it may here be stated that its objects are to collect data in reference to the breeding possibilities of sows in the various pure-bred herds in Canada, to systematize this information into a permanent official record, and in this way to make available information as to the merits of a registered sow and her offspring in the same way as information can be at present obtained as to the merits of registered dairy cattle.

In order to obtain all the information which might be required for such a policy when in operation, all the pigs in the four litters used for this work were weighed individually at birth and again when they reached the age of six weeks, when they were ear-tagged. At this age three pigs were selected from each litter to represent their respective litters in the slaughter test. Two only of these were used for the slaughter test, the third being carried more or less as a spare in the case of some accident to one of the other two. All the pigs in each litter were weighed individually at monthly intervals and a complete record kept of all feed consumed until the three selected pigs weighed from two hundred to two hundred and twenty pounds. When this weight was reached two of the three selected pigs from each litter were shipped to Swift's abattoir at Edmonton for a slaughter test. In this way complete detailed information was obtained as to the weights at birth, weaning, and at monthly intervals, feed consumption for the total period, and balanced with the pigs' weights at monthly intervals, the cost of production, the time required to finish, and the nearness with which three pigs may be considered representative of the full litter.

This information was secured in the way of preliminary study of Advanced Registration with swine and as a possible guide in the preparation of a policy. This objective has been reached and a publication has been prepared and will probably be issued, indicating the results of this work on the different Experimental Farms.

FIELD HUSBANDRY

The season of 1928 was unusual in many respects. The weather in late March and early April gave promise of an early spring, the snow being all gone and the temperature warm and spring-like, with a thunder storm on the last day of March. After these indications of spring weather, however, the weather turned cold and windy, and no work was done on the land until after the third week of April. May was very dry with many strong winds, which caused considerable damage by soil drifting. Germination of the grain during this month was very poor, excepting on very well-prepared summer-fallow where there was a good reserve of stored moisture. Even where moisture was present, the conditions appeared to be nearly ideal for the growth of weeds of all kinds, and when abundant moisture came in June these weeds had gained such a foothold that many crops never overcame them and hundreds of acres were ploughed down. The remainder of the season after the first week in June was very satisfactory and the grain crop gave promise of an average yield of good quality until the frosts of the 23rd, 24th, and 25th of August, which reduced the value

of all crops. Wheat sown very early or of an early variety, and cut before the frost, graded one or two northern, while most of that cut after the frost graded feed.

A redeeming feature of the season was the dry open fall, which allowed for harvesting and threshing under the best possible conditions. The dry fall, however, prevented beneficial results from fall cultivation by failing to germinate weed seeds to be later killed by frost. Also the soil was so hard and dry that there was not the amount of ploughing done that the time available merited.

On this Station wheat, oat, and barley yields were about average. As Garnet is grown almost exclusively on the larger fields, this was all cut before frost and graded two northern. Some Marquis was grown, and this was badly frozen and graded feed. Sunflowers produced an average yield but the season was shortened by frost. Corn was poor, as the germination was very slow in the spring and the earliest frosts which damaged the grain froze the leaves and made it necessary to harvest early. The yields were below average.

Root yields were good and the quality excellent. The dry weather in May made it appear that there would be no hay crop, but the rain in June caused a quick recovery and average hay crops were harvested of both rye grass and sweet clover. Two fields sown to rye grass with oats in 1927 were ploughed and sown to oats for green feed as the stands, following a heavy crop of oats in 1927 which had lodged, were very poor. The stands following a nurse crop of barley were superior to those following oats.

ROTATIONS

Seven rotations are being carried on at this Station. Some have been under way for fifteen years, while others have only been started. The length of these rotations vary from three to eight years and some one of them should be adaptable, or could be changed sufficiently, to be adaptable to any farm. In this rotation work it is our endeavour to enter all costs of work and all returns for produce at current rates charged and realized by the farmers. Most of the rotation fields are of five acres in size, though rotation C is two and one-half acres and rotation J is twelve acres.

The cost and return prices used for 1928 are as follows:—

RETURN VALUES

Wheat	$ 1 10 per bushel
Oats	0 45 "
Barley	0 45 "
Western rye grass hay	9 00 per ton
Oat or barley straw	2 00 "
Sunflower and corn ensilage	3 00 "
Turnips	1 50 "
Oat sheaves (cut green)	5 00 "

COST VALUES

Rent	$ 3 00 per acre
Barnyard manure	1 00 per ton
Seed wheat	1 50 per bushel
Seed oats	0 80 "
Seed barley	1 00 "
Seed turnips	0 80 per pound
Seed sunflowers	0 12 "
Seed sweet clover	0 12 "
Seed western rye grass	0 07 "
Seed corn	0 08 "
Machinery	1 35 per acre
Horse labour (single horse)	0 08 per hour
Manual labour	0 25 "
Tractor operator	0 80 "
Use of tractor	1 00 "
Rent of ensiling machinery	0 18 per ton
Twine	0 14 per pound
Threshing wheat	0 13 per bushel
Threshing oats	0 11 "
Threshing barley	0 12 "

COST OF PRODUCING CROPS

The costs in producing wheat, oats, barley, corn, sunflowers, and turnips are itemized in the following tables. The value, profit or loss, and yield are also shown and give a good indication of the comparative yields which can be expected from the various crops and treatments. A six-year average is inserted for the totals, but since the itemized charges are nearly constant, or vary in accordance with the yield, they have not been inserted.

COST PER ACRE OF PRODUCING WHEAT

—		Wheat after fallow	Wheat after wheat	Wheat after hoed crop	Wheat after hay
		$	$	$	$
Rent and taxes		3 00	3 00	3 00	3 00
Manure		0 40	0 50	2 20	2 00
Seed		1 88	1 88	1 88	1 88
Machinery		1 35	1 35	1 35	1 35
Twine		0 55	0 39	0 29	0 36
Manual labour		0 60	1 09	1 09	1 23
Horse labour		0 52	1 19	1 23	1 38
Threshing		3 89	3 29	4 62	3 45
Cost of summer-fallow		5 70	2 80	.....	.....
Total cost per acre	1928	17 89	15 49	15 66	14 65
	6-year average	18 21	15 78	15 16	14 33
		bush.	bush.	bush.	bush.
Yield per acre	1928	29·9	25·3	35·5	26·5
	6-year average	27·2	22·3	24·2	22·8
		$	$	$	$
Value per acre	1928	32 89	27 83	39 05	29 15
	6-year average	28 59	23 19	25 69	19 18
Profit per acre	1928	15 00	12 34	23 39	14 50
	6-year average	10 38	7 41	10 53	4 85
		cts.	cts.	cts.	cts.
Cost per bushel	1928	60	61	44	55
	6-year average	66	70	62	62

The foregoing table indicates that the second crop of wheat is the most expensive to produce per bushel and wheat on fallow the next highest. The wheat following hoed crop or hay was the most economical to produce for an average and in 1928.

COST PER ACRE OF PRODUCING OATS AND BARLEY

—		Oats	Barley	
		After wheat	After hoed crop	After oats
		$	$	$
Rent and taxes		3 00	3 00	3 00
Manure		1 10	2 00	2 40
Seed		1 60	2 00	2 00
Machinery		1 35	1 35	1 35
Twine		0 44	0 45	0 23
Manual labour		1 06	0 75	1 00
Horse labour		1 16	0 77	1 12
Threshing		6 50	5 98	3 02
Cost of summer-fallow		.....	2 08	.....
Total cost per acre	1928	16 21	18 38	14 12
	6-year average	16 61	18 45	15 95
		bush.	bush.	bush.
Yield per acre	1928	59·1	49·8	25·2
	6-year average	54·1	37·3	31·8
		$	$	$
Value per acre	1928	29 57	22 41	12 64
	6-year average	26 02	21 07	18 87
Profit or loss per acre	1928	13 36	4 03	−1 48
	6-year average	9 41	2 62	2 92
		cts.	cts.	cts.
Cost per bushel	1928	27	37	56
	6-year average	31	50	50

By the above table we would conclude that though barley was produced at a profit after hoed crop and at a loss after oats in 1928, the six-year average returns were about equal. With an average yield as above, it costs fifty cents per bushel to produce barley and thirty-one cents to produce oats.

COST PER ACRE OF PRODUCING CORN, SUNFLOWERS AND TURNIPS

—		Corn	Sunflowers	Turnips
		$	$	$
Rent and taxes		3 00	3 00	3 00
Manure		2 13	2 00	2 00
Seed		3 20	4 51	2 40
Machinery		2 40	2 56	1 35
Twine		0 43	0 42	.....
Manual labour		11 21	18 77	12 95
Horse and tractor labour		8 38	9 46	4 32
Cost of summer-fallow		1 39	.....	4 16
Total cost per acre	1928	32 14	40 72	30 18
	6-year average	27 49	30 07	36 74
		tons	tons	tons
Yield per acre	1928	5·86	6·72	15·72
	6-year average	7·84	8·20	16·98
		$	$	$
Value per acre	1928	17 58	20 16	.....
	6-year average	23 52	24 60	.....
Loss per acre	1928	14 56	20 56	.....
	6-year average	3 97	5 47	.....
Cost per ton	1928	5 49	6 06	1 92
	6-year average			

The foregoing table goes to prove that sunflowers and corn ensilage are rather expensive to produce and ensile and at a value of $3 per ton are produced at a loss.

SUMMARY OF ROTATION RESULTS

Rotation "P", in which there are eight fields, has been under way at this Station for sixteen years and has shown a profit of $4.18 per acre. This rotation is summer-fallow, wheat, wheat, summer-fallow, hoed crop, barley seeded down to rye grass, and two years of hay or pasture. As there is only one quarter of the land in cash crop it is not suitable for most western districts.

Rotation "Y", in which there are six fields, shows a profit per acre of $4.34 in a nine-year average. The rotation is wheat, hoed crop, wheat, oats seeded to rye grass, and two years of hay or pasture. There is no summer-fallow, the hoed crop taking its place as a substitute. Wheat following hay in this rotation is usually low in yield and we have concluded that where the climate is as dry as it is here, summer-fallow as a substitute for it should follow after hay and before grain. A third of this rotation is cash crop and would be suitable for special conditions where considerable stock was raised.

Rotation "J", in which there are six fields, has shown a profit per acre of $4.56 in sixteen years. The order is summer-fallow, wheat, wheat, oats seeded to rye grass, and two years of hay or pasture. This rotation is being practised on some farms in the west with considerable success. One-third of the land is in cash crop each year and, while there is a high percentage of hay, this serves a very beneficial purpose in improving the land and assisting in eradicating weeds.

A five-year rotation of corn, wheat, oats, barley seeded to sweet clover, and one year of hay has given an average profit over seven years of $4.34. This rotation contains no summer-fallow and should be very suitable for a farmer who is keeping considerable stock. By this rotation nearly all the feed he would require is produced as well as a cash crop.

Another five-year rotation which has only been under way for two years and for which there are not sufficient data available is summer-fallow, wheat seeded to sweet clover, hay, wheat, and oats. This outline contains two-fifths cash crop and a summer-fallow, and so far the yields promise to be very good. Wheat to date has proven to be a very good nurse crop for the clover, though the wheat after sweet clover hay has given a rather low yield.

A four-year rotation also under way only two years is summer-fallow, wheat, wheat, and oats. This conforms very closely to the common rotation followed on many western farms, and where very little stock is raised is quite satisfactory. A rotation of this nature where only summer-fallow and grain growing is practised has a tendency to encourage the increase of annual weeds.

Rotation "C", consisting of summer-fallow, wheat, and wheat, is still practised possibly more than any other through the west and particularly in the drier sections. A ten-year average at this Station has shown a profit of $7.28 per acre. Annual weeds appear to be gaining more prominence in this rotation, and where wild oats are present it is very difficult to clear them by following this order. A high percentage of cash crop is accountable for the high profit, but where carried on for a long period the profit may be reduced through lower yields.

CULTURAL EXPERIMENTS

Upwards of thirty cultural experiments are being carried on. Some have been under way for several years and show fairly conclusive results, while others are only started. In this report only those which have been in progress for a few years will be mentioned. Following is a list of these:—

Manure for Hay.—An application of manure on hay land has shown a decided increase in the hay yield the year after applying, both for first and second year hay, but when one dollar a ton is charged for applying, it proves a loss.

Manure for Wheat.—Twelve tons fresh manure applied in winter has given the highest yield, with twelve tons rotted manure applied in fall next highest.

Manure for Sunflowers.—Twelve tons rotted manure applied in summer-fallow year has given highest yields.

Dates of Planting Corn for Ensilage.—Corn planted the third or fourth week after spring opens has given the highest yields. This would be about the twentieth of May in an average year.

Dates of Planting Sunflowers.—The earliest planting of sunflowers has given largest yields and produced the best quality of ensilage.

Dates of Seeding Flax.—The third week after seeding commences has given the best results with flax. Flax is very susceptible to late spring frosts.

Dates of Seeding Wheat.—Best results have been obtained from seeding about a week after work on the land commences.

Dates of Seeding Barley.—Barley has yielded highest when sown about two weeks after work commences.

Dates of Seeding Oats.—Oats have given best results when sown about a week after work commences, though the spread in yield between dates of seeding is not so great with oats as with wheat or barley.

Dates of Seeding Fall Rye.—September 1 to 15 is the best time to sow fall rye.

Rates of Seeding Flax.—One-half bushel or slightly less is the best rate to sow flax.

Rates of Seeding Wheat.—One and one-half to one and three-quarters bushels has given best results on this soil.

Distance of Thinning Sunflowers.—Three-inch spacing or about as sown has given the highest yield and the best quality of ensilage.

Distance of Thinning Corn.—Corn, like sunflowers, is best left as sown for ensilage.

Methods of Planting Sunflowers.—Sunflowers planted in 30-inch rows have given the greatest returns. Planting in six-inch rows has given lower yields but the stalks are very fine and, excepting for the border of the field, can usually be harvested with a grain binder quite conveniently.

HORTICULTURE

SEASONAL NOTES

The average temperature for October, November, and December of 1927 was nine degrees lower than the average for the same months for the previous seventeen years, and the average for January, February, and March of 1928 was eight degrees higher than that of the previous seventeen years, but the average for the next six months was very close to the average for the previous seventeen years. There was more winter-killing of shrubs and fruit trees than ever before at the Station, and it would appear that the late growth in 1927, induced by high precipitation in the late fall followed by low temperatures in October and November were, at least in part, responsible for the damage noted. Plants protected by the snow, such as strawberries and herbaceous perennials, came through with but little loss.

Very little rain fell during the early part of the growing season and high winds with attendant rapid evaporation soon reduced the moisture content of the soil to such an extent that much of the seed sown during the month of May failed to germinate until the arrival of the June rains and, as a result, there were some uneven stands in the vegetable plots.

During June liberal rains and cool weather provided suitable conditions for the growth of cool season crops and for transplanting vegetables and bedding plants. The cool weather, however, was not favourable for the germination of the seed of the corn and vine crops and retarded their growth.

All crops made rapid growth in July, but a cool August with killing frosts at the end of the month spelled failure for corn and melons. With the exception of these crops and also cumumbers, pumpkins, and squash, vegetables yielded well.

Annual flowers made a fine showing in July and August, but the perennial border was not up to the standard of 1927.

All trees and shrubs made a normal growth, many of the latter making a rapid recovery from the setback received during the previous winter.

VEGETABLES

ASPARAGUS

Asparagus yielded at the rate of seven pounds one ounce per 30-foot row. The average yield for six years is six pounds two ounces. The season extended from May 17 till June 30. The variety grown is a Washington strain. Mary Washington is the variety now generally recommended for planting.

BEANS

The first picking for green beans was made August 8, from sowings made May 28, and the last picking on August 31, when frost killed the plants. Over a series of years higher yields have been secured from beans planted during the last week of May than from earlier sowings.

Dwarf or bush varieties of good quality that have given satisfactory yields for a period of five years or more are: Stringless Green Pod, Round Pod Kidney Wax, Red Valentine, Davis White Wax, Black Seeded Wax, and Daniels Incomparable. Promising varieties that have been tested for a shorter period are Princess of Artois, Masterpiece, and Challenge Black Wax.

Fair yields of Pole or Runner beans were secured from the varieties Kentucky Wonder Wax, Daniels Giant Podded, and Scarlet Runner.

Fair yields of Broad beans were harvested from the varieties Kentucky Wonder Wax, Daniels Giant Podded, and Scarlet Runner.

Two Dwarf varieties of Lima beans, Burpee Improved and Henderson Bush Lima, and two tall varieties, Leviathian and Burpee Giant Podded Pole Lima, were planted, but no pods were set on any of these varieties.

BEETS

The quality of the beet crop was exceptionally good, most varieties being smooth and of excellent colour. The finest quality was exhibited by a strain of Detroit Dark Red from the Central Experimental Farm, O-10467-8. Flat Egyptian is a good early variety and Detroit Dark Red is one of the best for the main crop.

BRUSSELS SPROUTS

The growing of Brussels sprouts at this Station has not been attended with much success, but the season of 1928 has proved an exception. From plants started in the hotbed on April 5 and transplanted to the open June 2, sprouts of fair quality were harvested October 16. Yields were as follows: Long Island Improved 14 pounds, Danish Prize 11 pounds, and Dwarf Improved 9 pounds per 30-foot row.

CABBAGE

Of the early varieties tested Golden Acre is the most satisfactory when yield, quality, and general dependability are all considered. Other equally early varieties that have given good yields are: Fordhook Forcing, Extra Early Express, Early Jersey Wakefield, and Early Summer.

Babyhead is a second early variety that heads well, is of good quality and will stand in the garden for a long period without bursting. This is an important varietal character in the home garden where it is desirable to have sound heads for use through a long period of the summer season without planting a number of varieties or making early sowings.

As a main crop variety Copenhagen Market has been found the most dependable, forming good heads and yielding well from season to season.

For winter storage Danish Ballhead and Extra Amager Danish Ballhead are the best keepers, but unless started in heat or sown early in the open they do not always form good heads.

CARROTS

Chantenay and Danvers have yielded well and are good quality varieties. Chantenay is preferred to Danvers as having a smaller core. Scarlet Nantes is a fine quality carrot but gives a smaller yield than Chantenay or Danvers.

CAULIFLOWER

Early varieties that head well and have proved satisfactory for a number of years are Early Snowball, Early Dwarf Erfurt, and Six Weeks. Veitch Autumn Giant forms fine heads in late summer and Danish Giant is ready for use in midseason.

CELERY

Paris Golden Yellow again headed the list in point of yield. This variety is one of the best under test, being possessed of good quality, yielding well and being attractive in appearance. Golden Self-Blanching, Easy Blanching, and Golden Plume have proved satisfactory both for yield and quality.

CUCUMBERS

Cool weather in June was unfavourable for the growth of cucumbers and although July was more favourable the crop was light. Varieties that set some fruit and have given good crops in former years are: Davis Perfect, Long Green, Early Russian, and Chicago Pickling.

CORN

Dry weather in late May retarded germination and cool weather in June was unfavourable for the growth of the corn crop, so that no ears were ready for use when the plants were killed by frost on August 30. The following varieties were well cobbed and almost ready for use when frozen: Banting, Pickaninny, Extra Early Adams, The Burpee, Old Squaw, Burleigh County Mixture, Golden 60-Day, Early June, Extra Early Adams, and Alpha.

KOHL RABI

Owing to adverse conditions for seed germination and rather dry weather in July this crop was almost a complete failure.

LEEKS

From seed sown in the hotbed on April 14 and transplanted to the open June 5, Dobbie International Prize, Monstrous, and Musselburgh yielded 21 pounds, 17 pounds, and 15 pounds respectively per 30-foot row. The average yield for all varieties for a three-year period is 23 pounds.

All varieties sown in the open were severely damaged by the onion root maggot.

LETTUCE

Of the loose-leaved varieties under test Grand Rapids is preferred.

Varieties of head lettuce that formed large firm heads of good quality are: New York, Iceberg, Hanson, and Big Boston. May King was found to be early, of fine flavour and tender.

MELONS

Owing to the cool season and early frosts no fruits were ripened.

ONIONS

Dry weather in May retarded the germination of onion seed and the onion maggot did considerable damage, hence the yield and quality of the crop were much below the average.

The highest yielding varieties for a period of five years ending 1928 are in order of merit as follows: Ohio Yellow Globe, Prizetaker, Cranston Excelsior, Yellow Globe Danvers, Ailsa Craig, Early Flat Red, Southport Yellow Globe, and Red Wethersfield.

PARSNIPS

Of the varieties tested Guernsey and Hollow Crown have given the heaviest yields. The outstanding feature of the experimental work with parsnips is the necessity for early sowing in this climate to have well-developed roots at digging time. The following table illustrates this point very clearly:—

PARSNIPS—DATES OF SEEDING

Variety	Date sown	Yield	
		Large roots	Small roots
		lb.	lb.
Hollow Crown	October 30, 1927	64	1
"	April 28, 1928	43	4
"	May 9, 1928	15	9
"	May 21, 1928	5	13

PEAS

Early varieties of good quality that have given satisfactory yields over a period of five years are: Thomas Laxton, Blue Bantam, American Wonder, English Wonder, Gradus, Gregory Surprise, and Extra Early Pedigree. Later varieties that have proved reliable croppers are: Bruce, Advancer, Stratagem, Harrison Glory, Danby Stratagem, Director, Lincoln, Reliance, Peter Pan, and Daisy.

PEPPERS

Very few fruits were ripened this year. Harris Earliest, Red Chili, and Neapolitan have given the highest yields over a five-year period.

PUMPKINS

Seed of ten varieties was sown in flower pots in the hotbed on April 17 and was transplanted to the open June 7. Five varieties matured fruits and yielded as follows: King of the Mammoths, 146 pounds; Sugar, 119 pounds; Pie, 111 pounds; Connecticut Field, 102 pounds; and Fort Berthold, 42 pounds. From seed of the same varieties sown in the open on May 29, Fort Berthold was the only variety to ripen fruits. Japanese Pie has been discarded as too late for this district.

SPINACH

King of Denmark and New Zealand have been selected as the best of the varietites tested. Victoria and Virofly are early varieties, but they usually bolt to seed early, making their season comporatively short.

RADISH

Many varieties have been tested and the following selected for quality: Scarlet Turnip, White Tip, Saxa, Non Plus Ultra, 20-Day, French Breakfast, and Icicle.

Winter Varieties.—In an attempt to secure information as to the best season for sowing winter radish five varieties were sown on four dates at intervals of fourteen days beginning May 11. Owing to hot dry weather in July each variety, in all sowings, bolted to such an extent that the whole lot had to be discarded.

SQUASH

The highest yielding varieties when started in the hotbed were: English Vegetable Marrow, Golden Hubbard, Delicious, and Warty Hubbard.

All varieties were sown in the open also, where English Vegetable Marrow alone matured fruits.

TOMATOES

Variety Test.—During the past five years one hundred varieties and strains have been under test. Of these, some have been tested as novelties for a single season only, but most of them have been under test for a period of two to five years or longer. The method of conducting these tests has been to set the plants which have been started in the hotbed in rows three feet apart with the plants spaced three feet in the rows. All plants are pruned to one stem and half of them are supported by stakes, while the other half remain untrained on the ground. The following table gives the yields of ripe fruit obtained from some of the highest yielding varieties during the past five years. Yields cited are from five plants trained to stakes and from five plants untrained, with the combined yields of both lots.

TOMATOES—VARIETY TEST

Variety	5-year average				Total yield	
	5 plants staked		5 plants unstaked			
	lb.	oz.	lb.	oz.	lb.	oz.
Herald	9	9	9	12	19	5
New Fifty Day	9	1	9	6	18	7
Alacrity x Earlibell	8	11	8	3	16	14
Bolgiano	9	5	7	0	16	5
Alacrity	7	7	8	2	15	9
IXL Extra Early	7	3	8	7	15	10
Wayahead	7	5	7	13	15	2
Burbank	6	8	7	15	14	7
Avon Early	7	11	6	8	14	3
Earliana	7	11	6	4	13	15
First and Best	5	5	8	0	13	5
Bonny Best	6	13	6	3	13	0
Danish Export	5	10	7	5	12	15
First of All	5	9	6	10	12	3
Self Pruning	5	6	4	15	10	5
Pink	4	4	5	11	9	15
John Baer	3	13	5	15	9	12
Monumental	5	6	3	15	9	5
Total	122	9	128	0		

From the above table it will be observed that the total for the unstaked plants is slightly higher than that for those staked. This is probably more than offset by the finer quality of the fruit from the staked plants, since there is more blossom-end rot among the fruit on the untrained plants and also more frost damage from the first light frosts.

The following varieties have been discarded as too late for this district: Beauty, Magnus, Favourite, Manyfold, Matchless, Norton, Coreless, Santa Rosa, Rosy Morn, San Jose Canner, and Greater Baltimore.

POTATOES

Dry weather in May was responsible for some missing hills among the potato experiments and this was more noticeable where cut seed was used than where whole tubers were planted. Killing frosts in late August and early September so shortened the growing season that late varieties had insufficient time

in which to fully mature. Judging from the results of the past three seasons, potatoes may not be safely left in the ground later than September 20. All seed was treated with corrosive sublimate used at the rate of four ounces to thirty gallons of water. When cutting the seed all tubers showing any degree of discoloration were discarded and the cutting knives were disinfected in a solution of formalin after cutting such tubers. Common scab, the only disease in evidence, had developed to a much greater extent on Irish Cobbler than on Early Ohio in the variety tests and field plots.

Variety Test.—Seventeen varieties were under test and each variety was represented by five systematically distributed rows each 68 feet long, with 30 inches between the rows. Guard rows were used where necessary and the rows extended sufficiently to permit discarding of the end hills at digging time. In point of yield Bovee headed the list with 352 bushels per acre and Early Ohio was second with a yield of 340 bushels. Vick Extra Early and Everitt were the only other varieties with yields in excess of 300 bushels per acre, yielding 322 and 308 bushels respectively.

TREE FRUITS

APPLES

The only apple of value for culinary purposes, that came through the winter without injury and bore a full crop of fruit in 1928, was the variety Osman. This crabapple makes a fine preserve and if used before it is over-ripe makes a delicious jelly. The Osman crab is on the approved fruit list of the Manitoba Horticultural Association and up to the present time is the most promising of the varieties tested here. Other crabs that survived the winter of 1927-28 and, although showing some injury, bore a light crop of fruit are Prince, Jewel, and Columbia.

The following varieties have been tested and found too tender to survive our winters: Anoka, Blushed Calville, Antonovka, Hibernal, Red Anis, Ostrakoff, Charlamoff, and Repka Kislaga.

Apple stocks budded in 1927 gave an excellent stand of young trees, many of them making a growth of four to five feet.

PLUMS

A number of Cheney seedlings bore a light crop of fruit, as did the Sioux sandcherry. Very few named varieties are showing promise. Varieties worthy of trial are Tom Thumb (a plum-sandcherry hybrid), Sioux, and Champa (both sandcherry selections), and also selections of the Manitoba wild plum.

SMALL FRUITS

RASPBERRIES

Mosaic disease has made it necessary to discard the old plantation. Stock of twenty-nine varieties has been secured and planted in the nursery row, where it has been carefully inspected and all diseased plants removed and burned. From these plantings stock of twenty-three varieties is now available for variety tests.

CURRANTS

Currants are a failure at this Station because of infestation of the fruit by larvæ of the currant fruit fly, for which no satisfactory control has been worked out.

STRAWBERRIES

In 1927 five varieties were planted in plots consisting of three 50-foot rows, the rows being spaced four feet apart with the plants fifteen inches apart in the rows. The plants were allowed to run so that matted rows were formed. The yields in 1928 were as follows: Senator Dunlap, 56 quarts; Rosthern June-Bearing, 54 quarts; Portia, 41 quarts; Cassandra, 37 quarts; Dakota, 36 quarts. When hardiness, yield, and quality of fruit are all considered, the three most promising varieties of those tested are Dakota, Senator Dunlap, and Rosthern June-Bearing.

Dakota is the hardiest variety of those tested and gives a fair yield of rather small soft fruit that makes a preserve of good colour and particularly fine flavour. Under adverse conditions this variety is likely to make a better showing than any other tested here. As a commercial berry the fruit is too small for profitable picking and too soft for shipping, but for the home garden, where comparatively small quantities are handled and where it is not necessary to ship the ripe fruit, the hardiness of the plants and the excellent quality of the fruit when canned make this a very desirable variety.

Senator Dunlap is medium in hardiness, yields well and produces fairly large firm fruit that handles well and makes a preserve of high quality. Where it is desired to grow strawberries for the market, Dunlap takes first place for this district among the varieties tested.

Rosthern June-Bearing has proved hardy and is a heavy cropper. The fruit is large, soft, and rather pale. It is good if used as fresh fruit or if preserved in an open kettle, but fades out to make a very pale, unattractive product if canned by the cold pack method and stored for some time. Because of its hardiness, heavy bearing, and the size of the fruit, this variety deserves a place in the home garden.

Canning.—All varieties have been subjected to a canning test in 1927 and 1928. In addition to the information listed an outstanding feature of this work is the loss of colour in all varieties when cold packed as compared with the open-kettle method.

ORNAMENTAL GARDENING

TREES

All trees listed as hardy in the 1927 report of this Station wintered well and made a normal growth in 1928.

Russian Poplars (*Populus petrowskyana*) started from cuttings in 1912 continue to die from canker on the higher portion of the planting site, while those on the lower land remain healthy. This would seem to demonstrate the necessity of using more permanent trees for planting on the dry prairies, or at least mixing more permanent trees with this poplar when it is planted. On low moist land solid plantings of Russian Poplar may prove quite durable.

SHRUBS

A list of the shrubs that are thriving here may be found in the 1927 report.

Many varieties of the common lilac were severely damaged by the winter of 1927-28. From the information available at this time it is not feasible to differentiate between the varieties under test as to hardiness since the location on the grounds apparently had almost as marked an effect on hardiness as had varietal differences.

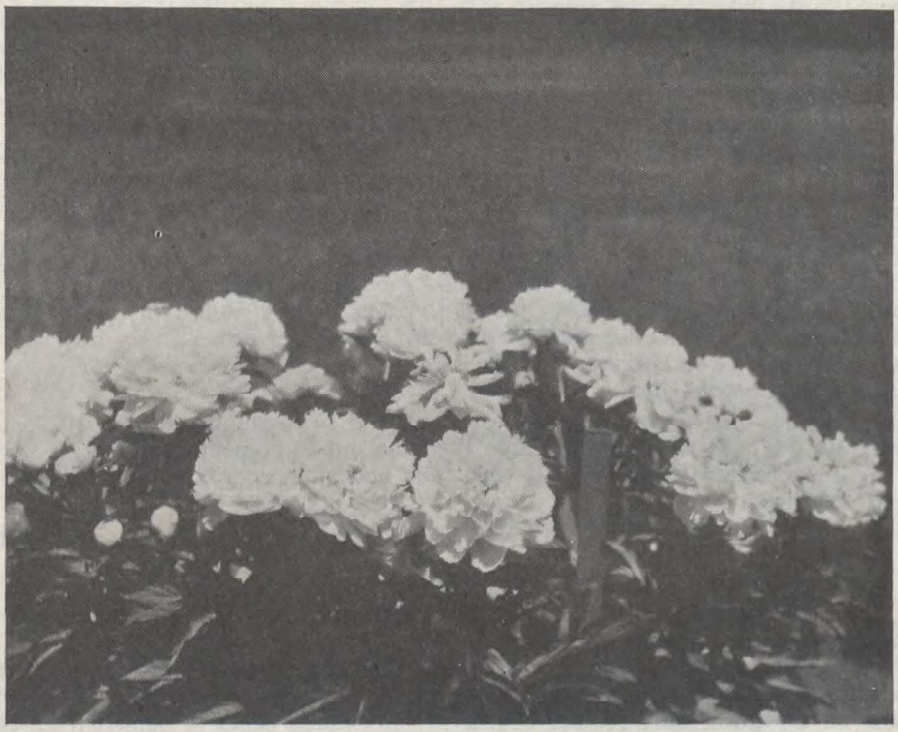
Lonicer alberti, previously listed as hardy, killed back during the past winter.

Rugosa roses showed some winter injury but made a vigorous growth after the dead tops had been pruned away and bloomed profusely in late summer.

Perennial Flowers.—A list of those that have proved hardy in the perennial border for a number of years was published in the 1927 report.

Fifty new varieties were added to the test plots in 1928 and seed of many others was sown from which fairly good stands of young plants were obtained.

Annual Flowers.—These gave a fine display of bloom during July and August. From the results of tests conducted for a number of years the following list is submitted as containing those best suited for planting in this district. The annuals listed have been started in boxes or pots in the hotbed, the young seedlings transplanted to garden flats about the time the second or true leaves appear, and finally transplanted to the open in early June. While some of the



Peonies have bloomed every year since 1913—two years after they were planted.

flowers listed may be sown in the open they bloom earlier if started in the hotbed or indoors and others requiring a comparatively long season in which to develop must be given this treatment in order to have bloom before killing frosts occur in the fall. The following are the annual flowers suitable for this district: *Ageratum,* imperial dwarf blue; *Alyssum maritimum* (sweet alyssum); *Amaranthus caudatus* (love-lies-bleeding); *Antirrhinum* (snapdragon); *Bartonia aurea; Brachycome iberidifolia* (Swan River daisy); *Browallia elata; Calendula officinalis* (pot marigold); *Callistephus chinensis* (China aster); Queen of the Market and Crego varieties and Heart of France Reine Marguerite; Chrysanthemum, annual varieties; *Chrysanthemum inodorum plenissimum* (bridal robe); *Coreopsis drummondi* (calliopsis); Cosmos early-flowering varieties; *Cynoglossum amabile* (Chinese forget-me-not); *Dianthus chinensis* (Indian pink); *Dianthus heddewigii; Dimorphotheca aurantiaca* (African

daisy); *Gaillardia picta* and *Gaillardia picta lorenziana* (blanket flower); *Gilia capitata; Helichrysum bracteatum* (strawflower or everlasting); *Helipterum* (rhodanthe or everlasting); *Jacobaea; Lathyrus odoratus* (sweet pea); early-flowering varieties; *Lobelia,* Crystal Palace Compacta; *Matthiola incana annua* (stocks), Ten-weeks varieties; *Nicotiana affinis* and *Nicotiana sanderae* hybrids (tobacco); Petunia; *Phlox drummondi;* Salpiglossis; *Scabiosa* (sweet scabious or mourning bride); *Tagetes* (marigolds), double African, dwarf French and tall French varieties; Verbena hybrids (Verbena); *Viola tricolor* (pansy); zinnia.

From an extensive list of annuals sown in the open the following have been selected as the most desirable for this purpose:

Alyssum maritimum (sweet alyssum); *Cacalia coccinea* (tassel flower); *Calendula officinalis* (pot marigold); *Callistephus chinensis* (China aster), Queen of the Market and Early Wonder varieties; *Clarkia elegans* and *C. pulchella; Coreopsis compacta,* golden wave; *Centurea moschata; Centaurea cyanus minor* (cornflower or bachelor's button); *Delphinium ajacis* (annual larkspur); *Dimorphotheca aurantiaca* (African daisy); *Eschscholtzia* (California poppy); *Erysimum perofskianum* (wallflower); *Gypsophila elegans* (annual baby's breath), pink and white varieties; *Helianthus* (annual sunflower); *Iberis* (annual candytuft); *Lavatera trimestris* (annual mallow), L. Loveliness and *L. Splendens rosea; Layis elegans; Leptosyne stillmani; Linaria* (toad flax); *Linum grandiflorum rubrum* (scarlet flax); *Lupinus* (annual lupin), *L. hybridus atrococcineus, L. Hartwegii* and *L. mutabilis; Malope; Mathiola bicornis* (night-scented stock); *Papaver* (annual poppy), Mikado, Double Shirley, carnation-flowered, Chamoise-rose, peony-flowered, Double White Swan and French Ranunculus; Petunia; Phlox *drummondii;* mignonette; *Saponaria vaccaria; Schizanthus* (butterfly flower); *Viola tricolor* (Pansy); Viscaria; *Lathyrus odoratus* (sweet pea).

A bulletin on annual flowers with lists of varieties for special purposes and districts may be had on request from the Publications Branch, Department of Agriculture, Ottawa, Ont. This bulletin is No. 60, New Series. It contains much useful information on the culture of annuals as well as terse descriptions of many of the less known kinds.

Many other annuals and additional varieties of those listed have been grown and information regarding them will gladly be furnished on receipt of request addressed to this Station.

CEREALS

Early varieties of cereals had a decided advantage this year due to the unusually severe early frosts. Dry weather in May caused slow germination in many cases and made stands rather patchy and uneven. The variety tests of wheat on summer-fallow were affected by a peculiar disease during late May and early June which caused a setback of about two weeks. The infection on the plots was rather irregular but appeared to attack all varieties alike. The disease appeared to destroy the primary roots of the young plants and caused a browning in the leaves. The plants in most cases immediately threw out secondary roots nearer the surface and eventually regained their natural vigor though they were of course later. Through lack of a better name, and until pathologists could determine the exact cause of the disease, it was called browning disease. This disease affected considerable wheat acreage throughout the district and always on summer-fallowed land. It appeared to have no

effect on oats or barley. The wheat plots on wheat stubble showed no infection and were a very even stand but, due to this disease, the natural spread between wheat on summer-fallow and wheat on stubble land was lessened.

WHEAT

Reward and Garnet wheat have attracted a great deal of attention during the past season due to their ability to ripen several days earlier than Marquis and thus escape damaging frost in many cases. Due to this characteristic, in the season of 1928, Garnet and Reward, in nearly every case, were free of frost while Marquis was damaged. Reward is usually slightly stronger in the straw, more rust resistant and produces a better quality of grain than Garnet. On the other hand Garnet at this Station has ripened slightly earlier and yielded much better than Reward in a seven-year average. From the data we have available we recommend the growth of Marquis where it can be ripened with fair security from frost but where this cannot be done, Garnet is advisable. Following is a table showing results from a seven-year average of six of the more common varieties of wheat and five others with a three-year average, on summer-fallow. The same varieties have been grown on wheat stubble and results for a two-year average are shown in this case. The data shown in this table are self-explanatory.

WHEAT VARIETY YIELDS, 1928

Variety	On fallow, 1/100 acre				On stubble, 1/45 acre			
	1928	Average			1928	Average		
	Yield per acre	Number of years	Yield per acre	Days to mature	Yield per acre	Number of years	Yield per acre	Days to mature
	bush. lb.		bush. lb.		bush. lb.		bush. lb.	
Marquis Ott. 15	30 25	7	30 43	121	27 45	2	33 17	117
Supreme	30 00	7	29 47	120	25 53	2	30 17	117
Garnett Ott. 652	27 30	7	29 41	111	30 23	2	34 53	109
Red Fife Ott. 17	27 30	7	28 23	125	25 53	2	30 28	122
Early Triumph	27 18	7	28 07	118	25 53	2	32 09	115
Reward Ott. 928	23 20	7	24 03	113	22 30	2	29 15	112
Preston Ott. 4	28 58	3	28 43	123	27 00	2	31 39	119
Producer Ott. 197	29 10	3	28 27	119	26 38	2	32 49	114
Ceres	29 48	3	27 21	120	29 15	2	34 47	115
Early Red Fife Ott. 16	30 00	3	23 38	124	27 23	2	30 23	120
Criddles Selected	32 05	3	23 22	125	27 00			

OATS

The oats on the variety test plots were sown quite early and the results were in most cases very good. Victory, Banner, and Gold Rain gave better yields than the others this season and also in a seven-year average. For this district and where a general purpose oat is required, a good strain of any one of these should be very satisfactory. Gold Rain is a yellow oat and is not favoured on the market because of its colour, but it is slightly earlier than Banner or Victory, shorter in the straw and lighter in the hull. Some of the others, as Alaska, are suitable for special purposes where earliness is of more importance than yield. Liberty is hulless and of particular merit for special feeds for poultry and young stock.

The following table shows the yields over a period of seven years on summer-fallow and five years on oat stubble:

OAT VARIETIES, 1928

Variety	On fallow 1/100 acre					On stubble 1/45 acre				
	1928 yield per acre		7-year average			1928 yield per acre		5-year average		
			Yield per acre		Days to mature			Yield per acre		Days to mature
	bush.	lb.	bush.	lb.		bush.	lb.	bush.	lb.	
Victory	83	28	63	21	109	59	19	48	00	108
Banner Ott. 49	86	14	61	15	109	65	18	48	30	107
Gold Rain	84	19	61	14	107	64	07	48	15	106
Leader	75	00	61	11	109	52	10	48	25	107
Gerlach	77	20	57	00	110	54	09	48	24	108
Longfellow Ott. 478	77	32	56	19	105	51	21	44	37	102
Alaska	62	17	46	27	100	57	20	39	05	97
Liberty Ott. 480	55	05	40	04	103	36	14	32	12	101

BARLEY

There are many types of barley, a few of which are suitable for special purposes only. The two and six-row hulled types are the common ones and possibly the best for general purposes. Hooded or awnless is suitable for hay or pasture and hulless for special feed. Hannchen and Duckbill are the two commonest two rowed types, the Duckbill being similar to the Thorpe. The Hannchen is generally a high yielding sort, surpassing the six-rowed types in this respect in many cases. It is, however, very weak in the straw and will go down quickly where the growth is heavy. Duckbill is strong strawed but very late. Most of the commonly grown six rowed types are Manchurian or selections of it, as O. A. C. 21, and Chinese. They are fairly strong in the straw and do well over a large range of soil and climate.

The following table gives a three year average of yields and days maturity for the more common varieties grown on summer-fallow and barley stubble.

BARLEY VARIETY YIELDS, 1928

Variety	On fallow 1/100 acre					On stubble 1/45 acre				
	1928 yield per acre		3-year average			1928 yield per acre		3-year average		
			Yield per acre		Days to mature			Yield per acre		Days to mature
	bush.	lb.	bush.	lb.		bush.	lb.	bush.	lb.	
Hannchen 2-rowed	48	09	42	05	102	47	17	39	32	99
Chinese Ott. 6-rowed	40	30	37	34	99	36	05	37	17	98
Bearer Ott. 475 6-rowed	48	21	35	45	105	44	14	42	44	102
Duckbill Ott. 57 2-rowed	36	10	33	15	106	25	38	32	46	103
Himalayan Ott. 59 hulless	37	24	33	06	92	34	11	32	34	92
Feeder Ott. 671 hooded	40	05	30	28	95	29	03	28	18	94
O.A.C. 21 6-rowed	38	01	30	22	100	31	42	31	36	99
Albert Ott. 54 6-rowed	27	29	23	41	92	21	38	29	45	92
Gold 2-rowed	50	38	.....	.....	.....	43	29	.....	.....	.....

PEAS

Though peas do very well under the western conditions they are not grown very extensively. In food value and consistency of yield they should be a very desirable crop to grow. They are, however, a more expensive crop to harvest than the ordinary cereals and no doubt this is the greatest reason why the

acreage is not more extensive. Various types have been grown at this Station from late large and small typed varieties to early large and small typed. Mackay, a very late large sort, is very suitable for oat and pea mixtures and when grown alone is a high yielder. For a mixture it is hard to surpass as it ripens about the same time as Banner or Victory oats and produces a very long straw. All the varieties which have been grown here have ripened well before frost is sown in good time. They can be sown as early as possible in the spring as they will germinate at a low temperature and do not suffer from late spring frosts. Lemaire, a very early sort, and a fair yielder, makes a short growth and would not be desirable as a fodder plant for this reason. Where there is danger of fall freezing, however, it should be very suitable as it ripens as early as the earliest barley.

The following table gives a three-year average of yields and days to mature.

PEA VARIETIES—YIELDS 1926-28

Name of variety	Yield per acre 1928	3-year average		Remarks
		Days maturing	Yield per acre	
	bush. lb.		bush. lb.	
Mackay Ott. 25	35 30	112	38 37	Creamy, large, smooth, with a black eye (hilum).
Early Feed	40 40	104	38 24	Green, large, angular.
Prussian Blue	35 30	109	37 50	Blue, Med. Size, smooth.
Golden Vine	41 00	102	37 47	White, small, smooth.
Champlain Ott. 30	39 00	110	35 51	White, large, smooth.
Cartier Ott. 19	36 30	110	35 37	White, large, smooth.
Chancellor Ott. 26	40 45	102	35 28	White, small, smooth.
Arthur Ott. 18	40 20	109	35 20	White, large, smooth.
Lemaire	30 50	82	34 07	White, medium, smooth.

FLAX

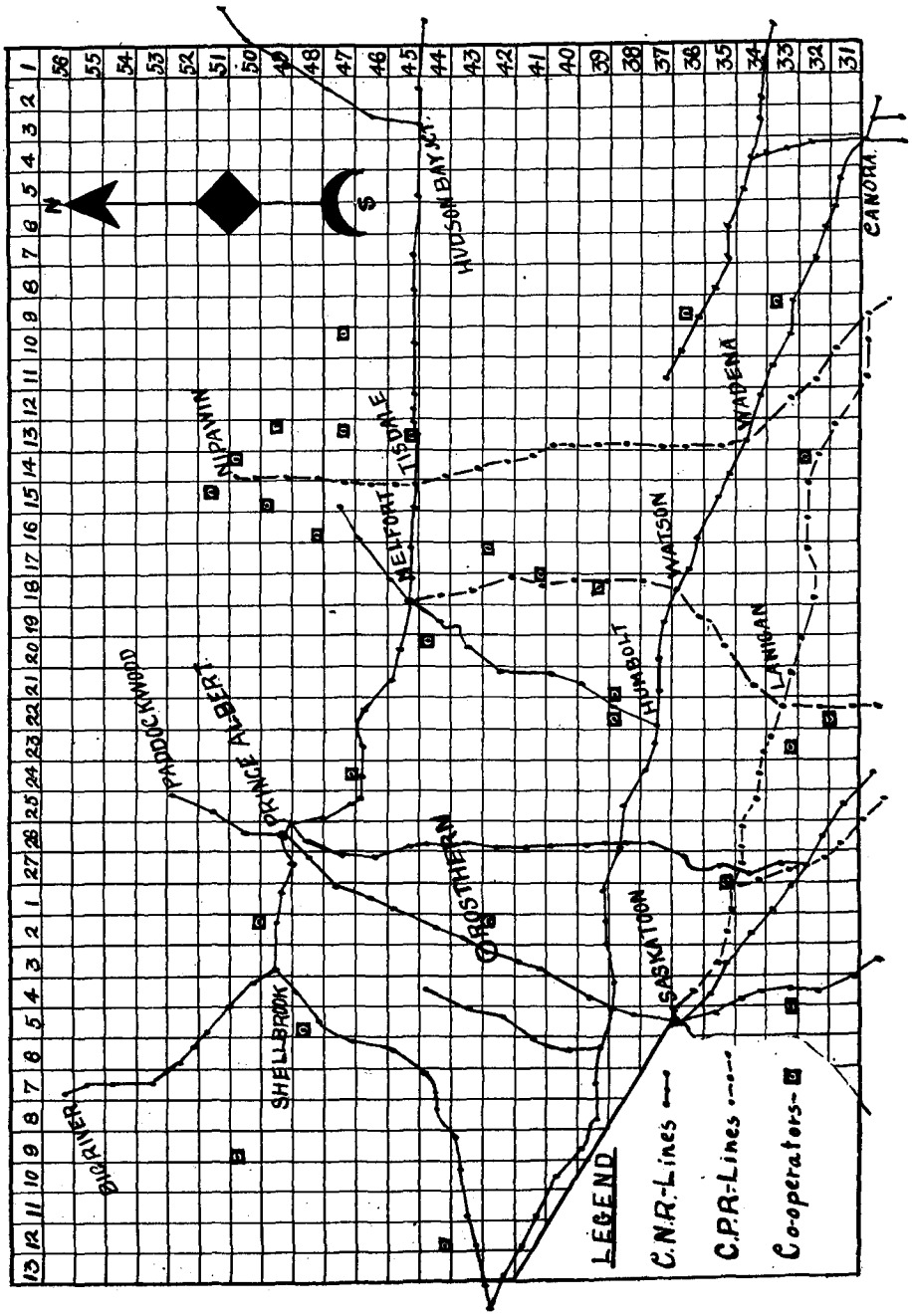
Four varieties of flax were grown with very good results, all ripening well and producing a good sample. All the varieties, Premost, Crown, Novelty, and Linota yielded nearly alike and any one should prove satisfactory.

ROD-ROWS

Upwards of fifty varieties of wheat and thirty of oats and barley were on rod-rows this year and replicated seven times. The results from these tests should be very reliable and aid in testing many varieties which could not be handled on a large plot. If a variety proves good in the rod-row test it can be later tested in larger plots which more nearly approximate the field conditions. These rod-row tests have been run for four years with good results and, while they do not correspond exactly with the larger plots, they still go a long way to coroborate the other tests.

CO-OPERATIVE TESTS

Several years ago it was realized that the variety tests of cereals carried on at the various Experimental Stations could not and did not represent the conditions on a very large part of the district which they served. Soil and climatic conditions vary very much in the West and, to overcome this, a plan was outlined whereby various chosen desirable farmers were sent seed with which to sow rod-rows of varieties of grain which it was considered might be desirable in their district. The seed was sent to these growers prepared so



Map of Rosthern Experimental Station district showing location of co-operators.

that the seed for each row was in one container, which lessened the work for the grower and increased the accuracy. The contents of each package was put in one row of a definite length. The grower takes various notes on the rows during growth and when ripe and then harvests the heads from each row into separate bags which are shipped to the nearest Experimental Station for threshing and weighing. The varieties are known to the growers by number only until a period of years has elapsed when they are informed of the identity and furnished with recommendations. This plan is working very satisfactorily and within a few years much valuable information as to the most suitable varieties for a district should be available.

At the present time there are twenty-eight farmers co-operating with this Station and in most cases they are carrying on their work very satisfactorily. A map is shown below giving the location of these men. Most are growing wheat though a few are testing varieties of oats, barley, or peas. We find that about six or eight varieties are about all that the average farmer has time to look after though there are a number of enthusiasts who handle more. A number of the older and more interested co-operators are Leonard Heugh of Lac Vert, Fred Distel of Marysburg, George Canfield, of Wild Rose, James Rugg of Elstow, and Seager Wheeler of Rosthern. There are a number who have taken on this work in later years who are very enthusiastic and reliable men and are taking a great interest in the work.

FORAGE CROPS

This season allowed too short a period between frosts and was rather dry in the spring and fall for the best results from any forage plants. Perennial and biennial hays were rather slow in starting in the spring, due to lack of moisture but, due to ideal conditions in June, recovered very well and produced an average crop. Annual hays, with the exception of oats and barley, were delayed too long, however, to produce good results. Corn was poor due to the slow growth in the spring and the early fall frosts on August 23, 24, and 25 which checked growth completely. Sunflowers produced an average crop but did not reach the usual stage of maturity attained at this Station. Roots yielded well and were of excellent quality but, due to early frosts, it was necessary to harvest them earlier than usual.

ANNUAL HAYS

Teff grass, annual and biennial sweet clover and several varieties of millets have been tested for the past few years to determine their value as annual hay crops. Teff grass is very subject to frost and while the quality of hay is excellent it cannot be recommended as a general hay crop.

Hubam sweet clover produces only slightly higher yields than the first year crop of the biennial and it, of course, bears nothing the second year. Hubam does not produce seed at this Station. It cannot be recommended.

Millets have a value where a quick growing annual hay is desired but is so frequently caught by the early fall frosts that considerable risk is attached to growing it. The yields are lower than those of oats or barley for hay. Common and Early Fortune millets are the most productive varieties and produce seed in most years.

OATS AND BARLEY FOR ANNUAL HAY

Several of the common oat varieties and Feeder, an awnless barley, have been tested as annual hays. Three stages of harvesting have also been compared; namely, when headed, about two weeks later, and when turning colour.

Victory, Banner, Gerlach, and Gold Rain oats all yielded well and are nearly a certain crop every season. Feeder barley yields considerably lower than the above oats and shells very readily when nearly ripe thus losing a great deal of the food value. The yields of cured hay from cutting two weeks after heading and from turning are nearly alike with turning stage usually a little the larger. When the superior food value of the well filled oats is considered and the apparently slight decrease in palatibility of the straw, the last stage of cutting is recommended for most purposes. For special purposes where small grain content is desired, however, one of the other stages of cutting may be better.

DATES OF SOWING OATS AND BARLEY FOR HAY

Commencing about the first week in May, Banner oats and Feeder barley were sown at one week intervals until the last of June. The yields of cured hay from the various dates do not vary greatly excepting as the precipitation during the season varies. If the spring and early summer are dry and late summer and early fall wet, the later sowing will naturally be highest and vice versa. The earlier sowings, however, do give a better quality of feed on an average season as the late June sowings are often very badly rusted or frozen. Oats or barley for a good quality of green feed should not be sown later than the first or second week in June.

MIXTURES OF PEAS AND OATS FOR HAY

Three varieties of peas and two of oats have been used in mixtures and the most desirable combination has been found to be Victory oats and Mackay peas. Both are strong, tall growing, and mature at about the same time. This allows for harvesting at the best stage for forage which is when turning colour with oats and when the pods are well filled with peas. Mixtures and methods of sowing used were 25, 50, and 75 per cent peas mixed with oats and sown together. Peas and oats were also sown in equal amounts separately, the peas being seeded one week and two weeks before the oats. Where mixtures were sown the drill was set at four bushels of oats per acre. Mackay peas and Victory oats were also sown alone for purposes of comparison.

Peas sown one week and two weeks before the oats and the 75 per cent mixture of peas yielded more cured hay than either oats or peas alone. Where 75 per cent of peas were sown with the oats the percentage of pea vine at harvest was about 40 while where peas were sown one week earlier the percentage of pea vine was 60 and where two weeks earlier it was 70. The other mixtures yielded less than peas or oats alone and contained a small percentage of pea vine at harvest time. Sowing peas one week before the oats is possibly the best method of insuring a crop with a fair amount of pea vine each year. If the peas are sown two weeks previous to the oats they get too strong a start and are likely to lodge before harvest making cutting difficult, and where sown at the same time the oats will overcome the peas and a small percentage of pea vine will be the result.

METHODS OF SOWING GRASSES AND CLOVERS

An extensive experiment, to determine the best method of sowing the common grasses and clovers for hay and seed, was started in 1921. Each kind was sown broadcast, both with a nurse crop and without, in six-inch, twenty-four inch, thirty-inch and thirty-six-inch rows. The whole experiment was repeated three times, two plots being cut for hay and two for seed. Difficulty was experienced several seasons in getting satisfactory catches, and up to 1924 little raliable data were obtained. Hay yields were calculated from the dry

matter yield on the basis of hay containing 12 per cent moisture. All plots were sown at from 15 to 20 pounds of seed per acre for broadcast seeding, and six-inch rows and the wider spacings with the drill set at the same rate. The nurse crop was oats sown at the rate of two bushels per acre and cut for green feed when turning. Plots were one-fortieth acre in size and borders were discarded at harvest time. Short averages only are available for second year cuttings as these were not considered in the original layout of the experiment. The seasons on which the results of this experiment are based represent a wide range of conditions, 1924 being very dry, 1925 sufficient moisture, 1926 very dry after May, 1927 abundant moisture all season, and 1928 dry spring and moist summer. All yields are given for one acre.

WESTERN RYE GRASS

It is usually quite easy to get a catch of this grass and the following results are based on a five-year average, during which time there were no failures in catches, though in 1924 the seeding with a nurse crop was too poor to be cut for seed.

WESTERN RYE GRASS SOWN WITH A NURSE CROP VS. SOWN ALONE

The following table gives a five-year average yield of first crop of hay one year after seeding:—

Sown with a nurse crop	1,380 pounds
Sown alone	3,131 pounds

Only a two-year average is available for the second year crop, and the first year crop for the same year is given for the purpose of comparison:—

	1st year	2nd year
Sown with a nurse crop	1,656 pounds	2,527 pounds
Sown alone	2,937 pounds	2,817 pounds

The preceding tables go to show that, when sown alone, the first crop, one year after seeding down, will be about double the yield when sown with a nurse crop. The second year after seeding the yields from the two methods will be nearly equal. The value of the nurse crop in the first year, however, more than offsets the gain in yield of hay the second year. When sowing alone there is often difficulty in checking weeds while the grass is getting established, and it may be necessary to mow one or more times to prevent the weeds from seeding. Where hay crops are used for weed eradication this is an important point.

Seed yields for a period of five years following nurse crop and seeding alone are given in the following tables:—

Sown with a nurse crop	284 pounds
Sown alone	534 pounds

A two-year average of yields from first and second year crops was as follows:—

	1st year	2nd year
Sown with a nurse crop	398 pounds	532 pounds
Sown alone	632 pounds	550 pounds

The results where seed was threshed were nearly identical with the hay yields in comparing the two methods of sowing. Seed threshed from the second year cutting was much superior to the first year, ripening much more evenly and being of a better quality. While these seed yields may appear to be rather small, they still make a fairly profitable return.

WESTERN RYE GRASS BROADCAST VS. SOWN IN ROWS FOR HAY

The following tables show a comparison of broadcast and row seeding. The six-inch-row plots should be practically the same thickness as the broad-

cast, though sown by a different method. The broadcast is sown on the surface and harrowed in, while the row sowings are put in with a drill. A five-year average of first year hay yields from broadcast and row sowings is as follows:

Broadcast	2,253 pounds
6-inch rows	2,498 "
24-inch rows	2,160 "
30-inch rows	2,174 "
36-inch rows	1,945 "

A two-year average of first and second year cuttings is as follows:—

	1st year	2nd year
Broadcast	2,721 pounds	2,629 pounds
6-inch rows	2,543 "	2,499 "
24-inch rows	2,192 "	2,923 "
30-inch rows	2,020 "	2,729 "
36-inch rows	2,008 "	2,582 "

The long average shows a considerable increase in yield of hay from the six-inch sowing with a more or less gradual decrease as the spacing becomes wider. There is a slight irregularity in that the 30-inch row is higher than the 24-inch row, but the differences are slight in the wider spacings in any case. In the two-year average the broadcast is highest with a gradual decrease to the 36-inch rows. The two seasons averaged in the second table were both good seasons with plenty of moisture which would tend to make the thickest stands higher than in dry years. A two-year average of second year cuttings shows the 24-inch and 30-inch rows high with a decrease both ways. The broadcast sowing for some unknown reason is slightly higher than the six-inch, but as the average is only for two years, we should not consider it as important. The most important conclusion to be drawn from the foregoing tables is that where hay is to be left sown down for one year only it is desirable to seed quite thickly, broadcast or in six-inch rows; but where the land is to remain in sod for two or more years, thinner seeding or row seeding will show an advantage. For the first year crop there is little difference between broadcast and six-inch planting, though it has been observed, and is indicated in the five-year average, that a much evener germination is obtained where the seed is put into the ground rather than scattered on the surface. This, of course, is most important in the drier areas. From the table we would also conclude that row seeding any wider than six inches for hay is not advisable.

WESTERN RYE GRASS BROADCAST VS. SOWN IN ROWS FOR SEED

Seed yields from broadcast and row sowings the first year were as follows for a five-year period:—

Broadcast	362 pounds
6-inch rows	407 "
24-inch rows	476 "
30-inch rows	456 "
36-inch rows	343 "

For a two year period the yields were:—

	1st year	2nd year
Broadcast	474 pounds	536 pounds
6-inch rows	536 "	522 "
24-inch rows	544 "	572 "
30-inch rows	553 "	572 "
36-inch rows	471 "	509 "

Seed yields in each case were highest from the 24 or 30-inch rows and little difference in yield is apparent between first and second year crop. The seed, as mentioned before, was of a superior quality from the second year cutting.

CONCLUSIONS RE WESTERN RYE GRASS

First year hay yields are about double where sown alone as compared with nurse crop.

Second year hay yields are about equal where sown alone and with nurse crop.

When value of nurse crop is considered, there is no advantage in sowing alone.

Weeds are troublesome the first year when no nurse crop is sown.

The conclusions drawn in regard to hay will apply when raising seed with and without a nurse crop.

Broadcast or six-inch rows give higher yields of hay the first year than wider spaced rows.

Seed yields are highest from 24 or 30-inch rows in both first and second year crops, but such wide spacing requires cultivation which materially adds to the cost.

BROME GRASS

It is much more difficult to obtain an even stand of brome than of rye grass because of the bulky nature of the seed which, if sown with a machine, does not feed evenly. No failures of catch were experienced, however, excepting in 1924 when the three plots of wide spacings were not representative. Once a catch of brome is obtained it will thicken very rapidly and seldom, if ever, kills. As with rye grass, only a two-year average of second crop yields is available.

BROME GRASS SOWN WITH A NURSE CROP VS. SOWN ALONE

A five-year average of first year hay yields with and without a nurse crop gave the following results:—

Sown with a nurse crop	1,174 pounds
Sown alone	2,592 "

A two-year average of first and second year yields was as follows:—

	1st year	2nd year
Sown with a nurse crop	1,522 pounds	2,316 pounds
Sown alone	2,479 "	3,131 "

The preceding tables show much the same results as were derived from rye grass in that the first year yields where sown alone are practically double where a nurse crop is used. The second year hay, while the yields are not equalized to the same extent as with rye grass, show a tendency to lose the effects of a nurse crop. Seed yields for a five-year period were:—

Sown with a nurse crop	no seed
Sown alone	292 pounds

A two-year average of first and second year crop was:—

	1st year	2nd year
Sown with a nurse crop	none	252 pounds
Sown alone	567 pounds	207 "

Brome will produce few seed stalks until well established and, where sown with a nurse crop, is weak, especially the first year after seeding. Then too, after brome becomes well established and thick, it produces few seed stalks.

BROME GRASS BROADCAST VS. SOWN IN ROWS

A five-year average of first year hay yields from broadcast and row seeding was:—

Broadcast	2,246 pounds
6-inch rows	2,364 "
24-inch rows	1,842 "
30-inch rows	1,531 "
36-inch rows	1,434 "

A two-year average of first and second year hay was:—

	1st year	2nd year
Broadcast	2,325 pounds	2,422 pounds
6-inch rows	2,268 "	2,700 "
24-inch rows	2,144 "	2,921 "
30-inch rows	1,693 "	2,578 "
36-inch rows	1,576 "	3,000 "

The difference between broadcast and six-inch sowings in first year hay yields is slight, but yield decreases quite rapidly as the distance between rows is increased. The second year crop is nearly the reverse, however, the widest spacing giving the largest yield and, but for the discrepancy of the 30-inch rows, gradually decreasing in yield towards the thicker sowings. The difference is also quite marked in the stands of the plots, as in the second year the rows in the narrow spacings can scarcely be distinguished, the roots having spread and filled the spaces between the rows. The grass on the wider spaced plots was several inches taller and more luxuriant than the broadcast and six-inch sowings.

Seed yields over a five-year period averaged as follows for first year crop:—

Broadcast	110 pounds
6-inch rows	218 "
24-inch rows	326 "
30-inch rows	391 "
36-inch rows	413 "

A two-year average of both first and second year crops was:—

	1st year	2nd year
Broadcast	226 pounds	170 pounds
6-inch rows	468 "	152 "
24-inch rows	687 "	266 "
30-inch rows	766 "	362 "
36-inch rows	690 "	275 "

The seed yields are, in each case, higher from the wider spaced rows up to 30 inches. The yield from broadcast sowing is low in every case. In a five-year average of first year yields the 36-inch rows have given the greatest yield and have yielded close to the 30-inch spacing in a two-year average. In the second year crop we have the same results as in the first excepting that all yields are much lower, indicating that the sod is getting too thick to produce an abundance of thrifty seed stalks. The seed yields of the best plots are rather low for profitable production of brome seed.

CONCLUSIONS RE BROME GRASS

The yield of hay the first year is about double where no nurse crop is used as compared with following a nurse crop.

The second year crop is highest after no nurse crop but tends to equalize.

Seed yields following a nurse crop were not worth threshing, but where sown alone yields were fair.

Seed from the second year crop was about equal whether following a nurse crop or following seeding alone.

First year hay yields decreased as the spacing between rows increased.

Second year hay yields increased as the spacing between rows increased.

Seed yields increased and decreased in the same way as the hay yields.

All seed yields were low and brome seed raising in this district is a doubtful venture.

In these conclusions no consideration is given to the value of the nurse crop.

SWEET CLOVER

There is usually little difficulty in getting a catch of sweet clover, though some failures have been experienced due to cutworms. In 1924 and 1925 the

new seedings were damaged considerably, particularly where sown alone. Some slight winter killing has been experienced but this has not been important. A six-year average has been taken in the following deductions.

SWEET CLOVER SOWN WITH NURSE CROP VS. SOWN ALONE

The hay yields were as follows:—

Sown with a nurse crop	2,658 pounds
Sown alone	5,660 "

The yields of sweet clover, following a nurse crop and sowing alone, are in about the same ratio as those of western rye grass and brome grass. In the case of the sweet clover, however, where the crop is used for hay, the plants sown alone grow very coarse and make a poorer quality of hay than where a nurse crop is used. Fine leafy stalks of a medium height are very desirable in this crop and for this reason it is not well to sow sweet clover alone for hay.

The value of the nurse crop is an important consideration and this has not been taken into account in these results.

Seed yields were as follows from a four-year average:—

Sown with a nurse crop	552 pounds
Sown alone	604 "

The difference in yields of seed from nurse crop and seeding alone is very slight, which is contrary to the general opinion that the very tall shrub-like plants produce more seed than the smaller ones. The taller plants, however, do not mature as much seed at one time as the smaller ones even though they may have longer racemes. Only a small proportion of the seed produced by a sweet clover plant is matured and still clinging to the racemes at one time. When a certain stage is reached the seed falls very readily. For this reason the amount of seed which can be threshed from small or large plants varies only slightly. The smaller plants can also be cut much more easily with less shattering in the binder than the heavy growth making less loss.

When the value of the nurse crop is considered the seeding with a nurse crop is much more advisable.

SWEET CLOVER BROADCAST VS. SOWN IN ROWS

A six-year average of hay yields from two plots seeded with a nurse crop and two plots seeded alone each year was as follows:—

Broadcast	4,566 pounds
6-inch rows	4,523 "
24-inch rows	4,239 "
30-inch rows	3,900 "
36-inch rows	3,568 "

With sweet clover the broadcast sowing is slightly highest in yield with a gradual decline in yield as the spacing becomes greater. Broadcast sowing also appears to be particularly desirable with sweet clover as there is a danger of placing the seed too deeply with a drill which retards and weakens germination. The thick sowings also gave a much superior quality of hay and were easier to harvest.

Seed yields from broadcast and row seeding were as follows. This average includes both seeding alone on two plots and seeding with a nurse crop on two plots each year for six years.

Broadcast	607 pounds
6-inch rows	649 "
24-inch rows	531 "
30-inch rows	640 "
36-inch rows	871 "

No statement can definitely be made as to the best method of sowing for seed production. The widest spaced rows have given the highest yield but the gradation between each method is not consistent enough for us to arrive at any conclusion. Either method of sowing gives fair yields however. Spacing wider than 6 inches allows an opportunity for weeds to develop that does not pertain to broadcast seeding or six-inch drills.

CONCLUSIONS RE SWEET CLOVER

Seeding sweet clover alone practically doubles the yield over nurse crop seeding but the quality of hay is inferior.

Seed yields are much the same from the various methods of sowing.

Hay yields are highest from broadcast sowings and gradually decrease as the spacing between rows is increased.

Seeding with a nurse crop is to be recommended when the value of the nurse crop is considered.

ALFALFA

Alfalfa has been a disappointing crop at this Station. There never has been difficulty in getting a stand nor in keeping a stand for a number of years, but only in seasons of higher than average rainfall is there growth sufficient to develop a crop worth cutting.

ENSILAGE CROPS

SUNFLOWERS

Four varieties of sunflowers were tested this year which represented four fairly distinct types as to earliness of maturity. The yields of all were low, due to adverse weather conditions during the season. Mammoth Russian and Russian Giant were quite similar in habit of growth but the former was much later, there being few blooms showing when cut. The Russian Giant produced considerable bloom and was in a fair stage of maturity for this season. Ottawa No. 76 is a fine stalked, medium early variety which gave the highest dry matter yield of all the varieties. An early variety obtained from the local Mennonite farmers ripened some seed but did not mature as well as usual. This variety is quite branching but yields too low to be used for ensilage purposes.

CORN

Eighteen varieties of corn were grown in a comparative test this year but, due to poor germination and a short growing season, results were very poor. The stands, with few exceptions, were very poor and this was apparently largely due to poor germination. All varieties were also very immature when cut. Longfellow gave the highest yield this season and stands high in a long average but, as it is quite late and rather immature at harvest time in the best season, it cannot be recommended over North Western Red Dent which produces a good yield and reaches a fair stage of maturity.

ROOTS

The yields of roots this season were good and the quality excellent. Though the weather in the early part of the season was dry, they made rapid growth during June and July when moisture was plentiful and while retarded in growth by lack of moisture in the fall still produced good crops. All roots excepting carrots were sown in 30-inch rows, thinned to 12 inches and most were harvested about the last of September. Seeding was done on May 15. Carrots were thinned to six inches between plants.

SWEDES

Fifteen varieties of swedes were tested, of which Bangholm from the Experimental Farm at Nappan gave the largest yield. Kangaroo from Steele Briggs, Magnum Bonum from Ewing and Northwestern from McKenzie's also yielded well, showing very little preference or variation.

Swedes are the most certain root crop at this Station, there being few failures during sixteen years. They also keep well in storage and are excellent feed for all kinds of cattle and sheep.

DISTANCE OF THINNING SWEDES

An experiment on various distances of thinning swedes has been under way at this Station since 1921. Distances of 6 inches, 12 inches, and 18 inches were used as representative of the common spacing practised. The following data are an average of six years, 1921 to 1928, omitting 1925 and 1926:—

6-inch thinning	25 tons	942 pounds
12-inch thinning	23 "	1,550 "
18-inch thinning	21 "	1,641 "

In considering yields only, the six-inch spacing has given the best returns with a gradual decline towards the widest spacing. We must also consider ease of harvesting and quality, however, as small roots produced where the spacing is close are more expensive to harvest and are not of such good quality as a well formed and grown root. With swedes as with most root crops, the undersized or oversized roots are seldom of as good quality as the medium sized ones produced from 12-inch thinning. The dry matter content of the small roots from the closer spacing is highest, thus giving a higher food value. All things considered, we would conclude that a compromise of 8- or 10-inch thinning would be the most desirable under the average conditions in the West.

FALL TURNIPS

Eleven varieties of turnips were tested which represented most of the common types on the market. Hardy Green Round from Sutton's gave the highest yield of dry matter and is a very good type of root, being nearly as firm as a swede. Purple Top Mammoth, Pomeranian, and White Globe from Steele Briggs and Purple Top Mammoth from Sutton also yielded well, there being little difference in yield between the four varieties. The last three are large and not so firm as the first one and, in certain seasons, are of much poorer quality. Early Six Weeks from Sutton's yielded considerably lower than the previous four but where late summer or early fall feed of this nature is desired it is very suitable.

DATES OF SEEDING FALL TURNIPS

Fall turnips were sown the middle of May and at one week intervals until the second week of July. All of the May sowings yielded well and were of good quality but after this date the yields were low and gradually decreased until the latest planting. From several years' results on this experiment, we would not recommend sowing fall turnips later than May.

MANGEL VARIETIES

Eight varieties of mangels were listed which represented all the common types grown. Yields were good though not exceptional and the quality was excellent. The intermediate type appears to be best suited to this soil, producing a high yield of regular shaped roots. Yellow Intermediate, Ottawa, Giant Rose from McKenzie's, and Danish Sludstrup from James Brothers, B.C.,

were the highest yielders. The oval globe and tankard types, while slightly easier to harvest than the intermediates, do not yield so well. The long types are difficult to harvest and do not yield as well as the intermediates.

MANGELS—TREATMENT OF SEED AND DATES OF SEEDING

Very little data are available on this experiment to date, but so far soaking mangel seed, while it promotes germination about two days ahead of dry seed, is really a detriment as it makes the seed very difficult to sow evenly with a drill. Seeding as early as possible and ten days later gave higher yields than a later sowing ten days after the second one.

CARROTS

Four types of carrots have been tested, namely, White Intermediate, Improved Short White, Danish Champion, and Oxheart. The first three have given good results but Oxheart is usually quite low in yield and often rough and cracked.

POULTRY

The flock of poultry consisting of about five hundred Barred Plymouth Rocks has shown steady progress since its beginning, about seven years ago, as measured by the average production of the flock, and this year all the hens retained for breeding purposes have records averaging well over 200 eggs of two ounces each for their pullet year.

The brooder house was burned on March 26, destroying 700 chicks and interrupting several experiments that were under way. Within two weeks a new brooder house was erected and, by submitting to various inconveniences during these two weeks, all the chicks hatched after the fire were taken care of.

A new incubator cellar and feed room have been built adjoining the brooder house.

PROGENY TEST

The flock used in this test is made up entirely of individuals of known ancestry. The records of two individuals are shown, giving the record of the dam, the dam of the sire she was mated with, and of her progeny.

—	Number of eggs laid in year	Average weight of eggs
		oz.
Sire's dam	275	2 1/16
Dam	235	2 1/4
Progeny—1	224	2 1/4
2	236	2 1/4
3	256	2 1/4
4	262	2 1/4
Sire's dam	227	1 15/16
Dam	196	2 1/4
Progeny—1	173	2 1/4
2	212	2 1/4
3	186	2 1/4

The table illustrates the transmission of similar characteristics of egg size and egg production in individuals of known ancestry.

A COMPARISON OF VARIOUS FEEDS FOR FATTENING COCKERELS

On July 20 of last year sixty cockerels were divided into five lots of twelve birds each, as nearly alike as possible as to weight, general thrift and breeding.

These lots were placed in fattening crates and fed wet mashes, mixed at the rate of one-third meal to two-thirds liquid. The mashes were mixed several hours before feeding time. Complete records were kept of the weights of all the mash fed and at each feeding all that was not consumed was removed and weighed again. The mash was fed daily at 7 a.m., 11.30 a.m. and 5.30 p.m.

The five lots were fed as follows:—

Lot 1.—Equal parts shorts, hulless oat chop, and barley chop mixed with skim-milk.

Lot 2.—Equal parts shorts, hulless oat chop, and hulless barley chop mixed with skim-milk.

Lot 3.—Equal parts shorts, hulless oat chop, and corn mixed with skim-milk.

Lot 4.—Equal parts sifted hulless barley, sifted oat chop, and shorts mixed with skim-milk.

Lot 5.—Equal parts sifted hulless barley, sifted oat chop, and shorts mixed with water.

The following table summarizes the results:—

CRATE FATTENING EXPERIMENT

—	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
Number of birds	12	12	12	12	12
Average initial weight lb.	3·04	3·07	3·07	3·02	2·98
Average finished weight lb.	4·12	4·23	4·32	4·23	4·07
Average gain lb.	1·08	1·16	1·25	1·21	1·09
Average dressed weight lb.	3·76	3·8	3·92	3·87	3·73
Average dressed weight %	91·3	89·8	90·7	91·3	91·8
Pound mash consumed lb.	90·38	80·73	80·16	79·54	134·94
Cost of feed consumed cts.	50	44	57	44	57
Average cost per pound gain cts.	3	3	3	3	4
Selling value of each lot at 28 cents per pound $	12 63	12 77	13 16	12 99	12 52
Profit over initial value at 20 cents per pound, and cost of feed $	4 83	4 94	5 21	5 28	4 80
Average profit per bird cts.	40	41	43	44	40

Feed prices on which the above values are based:—

Shorts.....$1.40 per 100 pounds	Hulled barley chop.....47 cents per bushel
Hulless oat chop.....52 cents per bushel	Sifted hulless barley....50 cents per bushel
Skim-milk.....02 cents per gallon	Corn.....$47.50 per ton
Sifted hulless oat shop.....60 cents per bushel	Hulless barley.....50 cents per bushel

The lot which received corn in the mash made a gain of 2·04 pounds more than the lot which received hulled barley, and 1·08 pounds more than the lot which received hulless barley.

The lot which was given hulled barley consumed about ten pounds more feed than the lots fed hulless barley and corn.

The lot fed hulless barley made the cheapest gains.

A comparison of lots 4 and 5 shows that 53 pounds of skim-milk saved 18·47 pounds of meal.

A second experiment was carried on similarly to the first except for a difference in feeds.

Lot No. 1 received equal parts of shorts, barley chop, and hulless oat chop.

Lot No. 2 received equal parts of shorts, barley chop and oat chop.

Lot No. 3 received low grade flour, barley chop and oat chop.

A summary of the results is given in the following table.

The lot on hulless oats made a total gain of 2·2 pounds more than the lot on ordinary oat chop.

The lot on ordinary oat chop cost ·94 cents more per pound gain.

Shorts and low grade flour had practically the same value as feeds.

SUMMARY OF FATTENING EXPERIMENT

—		Lot 1	Lot 2	Lot 3
Number of birds		12·00	12·00	12·00
Average initial weight	lb.	3·47	3·37	3·35
Average finished weight	lb.	4·52	4·24	4·38
Average gain	lb.	1·05	·87	1·03
Average dressed weight	lb.	.....	.....	.....
Mash consumed per lot	lb.	114·92	116·85	106·68
Value of mash	cts.	64	62	67
Cost of mash per lb. gain	cts.	05	05	05

Feed prices:—

Shorts	$1 40 per 100 pounds
Barley chop	0 47 per bushel
Hulless oat chop	0 52 per bushel
Oat chop	0 38 per bushel
Low grade flour	2 25 per 100 pounds

APICULTURE

For the season of 1928 the Station apiary was made up of fifty colonies. Forty-two of these were over-wintered colonies, and eight were built up from three-pound packages.

The table below summarizes the results obtained from these:—

Bees	Number of colonies	Number of combs covered in spring	Number of combs covered in midhoney flow	Average crop per colony		Remarks
				lb.	oz.	
Overwintered	42	5·8	25·4	35	13·7	Supplied 7 nuclei for queen-rearing.
Package	8	(3 lbs.)	23·0	19	1	Supplied 2 nuclei for queen-rearing.

The above figures cannot be taken as an exact comparison of package with over-wintered bees for the season of 1928, as the crops grown within a radius of four miles did not afford sufficient bee pasturage for the fifty colonies to produce maximum yields.

OUT-APIARY

An out-apiary of eight colonies was established six miles east of the Experimental Station. This apiary was made up of four colonies built up from three-pound packages and four over-wintered colonies.

The following table illustrates the amounts per colony of bee-reproduction and honey production:—

RECORD OF COLONIES IN OUT-APIARY

Hive number	Kind of colony	Size of package	Number of combs covered by bees in spring	Number of combs covered by bees in midhoney flow	Crop		Remarks
		lb.			lb.	oz.	
251	Package	3		33	78	0	Swarmed July 8.
252	"	3		43	75	3	
253	"	3		36	62	8	
254	"	3		43	75	5	
226	Over-wintered		7	46	128	9	
227	"		9	35	124	0	2-pound package added April 24.
228	"		7	19	49	7	Requeened July 12.
229	"		7	42	100	11	
	Total				693	11	

Bee pasturage for the bees in the out-apiary consisted of three acres of white sweet clover grown for seed, one-half acre of raspberry bloom, several acres of fruit trees, some caragana hedges, and a flower garden, besides a limited number of wild flowers.

The results from the out-apiary are of especial importance as indicative of possibilities on a great number of farms in the district where some member of the family can give to a few colonies the care and thought they need.

INFERENCES TO BE DRAWN FROM THE SEASON'S RESULTS IN THE OUT-APIARY

While definite conclusions cannot be arrived at in the first season of operation, the season's results indicate that:—

1. An apiary is profitable in a locality where the bees have pasturage and reasonably good management.

2. The amount of cultivated crops affording bee pasturage is of first importance to profitable bee-keeping in the locality, and among such crops sweet clover is the most important.

OVER-WINTERED VS. PACKAGE BEES

In order to give reasonably profitable returns the bees must be wintered locally. This inference is drawn from the figures for 1927 and 1928 given below, showing the average expenses and returns per colony of over-wintered and package bees.

RESULTS FROM OVERWINTERED AND PACKAGE BEES

Item	Over-wintered	3-lb. package
	$	$
Cost of bees and queen per colony including express charges		7 00
Average cost, per colony, of package bees added to overwintered bees	1 07	
Average cost of sugar for feeding one colony in spring 1928		0 59
Average cost of honey for feeding one colony in spring 1928	1 31	2 38
Average cost of sugar for feeding one colony in fall 1927	2 23	
Average cost of honey for feeding one colony in fall 1927	2 18	
Cost of wintering equipment for one winter for one colony	0 30	
Estimated cost of time required to feed and pack one colony for winter	0 50	
Estimated cost of stores consumed between honey flow and winter feeding	1 50	
Total average expense per colony	9 09	9 97
Average crop value per colony	16 45	12 26
Average excess of profit over expenditure per colony	7 36	2 29

The above figures are based upon results where wintering was one hundred per cent successful. In drawing deductions from them, however, the winter risk must not be disregarded. In this district bees must be carried over in winter quarters from the beginning of October until the end of the following April, through temperatures which may range from 78° F. above zero in October to 59° F. below zero in January, and successful wintering presents by far the greatest difficulty connected with beekeeping in the locality.

PERIOD OF HONEY FLOW AND SOURCES OF NECTAR

Two overwintered colonies in the Station apiary were kept on scales from May 23 to September 12 and their weights recorded daily at 7 a.m. The table below summarizes the season's record.

COLONIES ON SCALES

Month	Colony	Number of days showing gain	Number of days showing gain of 1 pound or more	Total gain or loss	Average daily gain	Chief sources of nectar
				lb.	lb.	
May	223	3	2	1·00	0·13	Caragana, fruit bloom, dandelion.
(8 days)	234	5	1	2·75	0·34	
June	223	7	4	−9·50	−0·32	Caragana, flowering shrubs, snowberry, garden flowers.
	234	9	5	3·75	0·13	
July	223	23	19	52·75	1·70	Sweet clover, white Dutch clover, garden flowers, snowberry.
	234	23	20	68·50	2·21	
August	223	9	6	−5·25	−0·17	Sunflower, fireweed, garden flowers, white clover.
	234	9	5	−4·50	−0·15	
Sept.	223	1	1	−6·50	−0·54	Some garden flowers.
(12 days)	234	3	2	−3·50	−0·29	
Total	223	.....	.....	32·50	.....	
	234	.....	.....	67·00	.....	

INFORMATION OBTAINED FROM THE HIVES ON SCALES

It was found that:—

1. There were two clearly defined periods of honey flow during the season. The first of these was from May 26 to June 4, and the second from July 6 to August 10. The first period coincides with the period of bloom of fruit trees, flowering shrubs, and the first blooming time of dandelions; the second period was the time of nectar production of white sweet clover and white Dutch clover and of most garden and wild flowers.

2. There were two periods of excess of consumption over production during the summer months. The first period was from June 4 to July 6, when the average excess of consumption over production was 16·5 pounds per colony, or 0·55 pounds per day. The second period began on August 10, when the season's main honey flow came to an end. After this date the average excess of consumption over production was 0·79 pounds per day per colony until September 12, when the hives were taken off the scales.

3. The lowest noon shade temperature at which gains were made was 60° F.

SWARM CONTROL

Two methods of swarm control were used during the season: the method of dequeening and requeening ten days later with a young laying queen, and the Demaree method of separating the brood and the queen. Both methods

proved effective this year as they have done in past years, although one colony treated by the latter method at 10 a.m. swarmed at 2 p.m. on the same day, indicating that the swarming impulse had progressed to a stage at which it could not be checked by this method.

THE WEATHER

There were a number of warm days in the early part of May, but the night temperatures were low, and the wintering cases were not removed until the end of the month. At this time and during the first week in June the days were warm and a good honey flow was recorded. In the last three weeks of June there were many wet days and the weather was too cool for the bees to take advantage of what nectar production there was. Excellent weather for honey production occurred in the first week of July, and conditions continued favourable until the middle of August. This month, however, was unusually dry, and the temperature, after the third week, was low with occasional frosts at ground level. The same conditions prevailed in September. Owing to this, there was practically no honey flow during the last quarter of the season. October weather was dry and comparatively warm, so that syrup was taken readily and the bees had ample opportunity to ripen and seal the winter stores.

WINTERING ARRANGEMENTS

The weighing and placing of colonies in the wintering cases was done in the last week in September. Feeding of all colonies was completed by October 25, and packing, which was added gradually, by November 3. Forty-two colonies are in out-door wintering cases in the Station apiary, and eight in the out-apiary. On October 27, the remaining eight were placed in a cellar at the Station, in order that more information may be obtained as to cellar wintering.

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