DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT

W. H. FAIRFIELD, M.S.

FOR THE YEAR 1928

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DOMINION EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

Two distinct types of farming are carried on in southern Alberta: irrigation and dry farming. Entirely different farm practices are required under irrigation than on non-irrigated land. To meet this situation the Experimental Station at Lethbridge was established where only part of the land was irrigable. About half of the area of the Station, therefore, is irrigated and the remainder cannot be irrigated. Two systems of farming are being carried out: one with irrigation and one without. The experiments in field husbandry, cereals, forage crops and horticulture are in a large measure duplicated; in other words, two experimental farms are operated under the one management, their object being not to compare the relative merits of the two systems, but to study their individual problems.

THE SEASON

Two outstanding features in connection with the season of 1928 were the extremely dry conditions that prevailed during the month of May, which seriously delayed germination in many grain fields, and the unusually copious rains received in June and July. The outcome of these conditions was that throughout the district excellent crops were produced on both dry and irrigated land, but the late germination in so many fields resulted in an unusually large percentage of the grain being damaged by frost. On the irrigated farms but little water was used on crops.

METEOROLOGICAL RECORDS AT LETHBRIDGE, ALBERTA, 1928

Month	Temperature F.			Hours of bright sunshine	Wind			Evaporation from free water surface, summer	Precipitation	
	Highest	Lowest	Mean		Mean hourly velocity	Greatest mileage in one hour	Direction		1928	Average 27 years
	°	°	°		miles			in.	in.	in.
January	59	−33	22·3	108·8	15·4	51	SW	.....	0·94	0·64
February	51	−22	26·2	161·7	13·3	46	W	.....	0·79	0·69
March	70	6	32·2	174·0	12·9	53	SW	.....	0·93	0·70
April	77	13	37·6	214·6	11·4	43	SW	.....	1·32	0·96
May	92	31	56·4	343·6	11·9	37	SW	5·90	0·09	2·49
June	80	34	55·6	225·6	8·0	30	SW	3·65	6·79	2·92
July	89	47	63·2	325·6	6·7	28	SW	6·74	3·98	1·90
August	90	31	58·9	303·9	6·9	23	SW	4·23	1·54	1·76
September	86	18	52·9	283·0	7·8	36	SW	4·97	0·24	1·76
October	70	14	39·0	132·3	11·0	41	W	.....	0·85	0·83
November	68	5	33·8	159·1	12·9	43	SW	.....	0·28	0·66
December	53	−24	25·7	112·3	13·8	42	W	.....	0·33	0·62
Total	.....	.....	.....	.....	.....	.....	.....	.....	18·08	15·93
Average	.....	.....	42·0	212·1	11·0	.....	.....	*5·10	.....	.....

*5 month's average.

Last spring frost occurred on May 14 when 31° above zero was registered. Last killing spring frost April 22 with temperature of 28° F.

First fall frost August 14 registered 31° F. Damaged wheat and other vegetation in spots throughout Southern Alberta.

First severe fall frost Sept. 8 with temperature of 26°F.

Station	Observer	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
		inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Barons	Rev. Jos. Lee	0·60	0·70	0·65	0·60	Nil	7·73	2·93	1·24	0·15	0·37	0·25	0·35	15·57
Bow Island	Geo. R. Calder	0·76	0·30	1·48	0·30	0·11	3·45	1·63	0·79	0·09	0·30	Nil	0·45	9·66
Bindloss	John Barnes	0·20	0·10	Nil	1·13	0·29	4·09	1·89	0·47	Nil	0·82	Nil	0·20	9·19
Carmangay	H. S. Gibson	0·52	0·45	0·35	0·55	0·02	4·28	1·91	1·11	0·14	0·25	0·15	0·15	9·88
Cessford	G. E. Griffith	0·55	0·95	0·10	1·45	Nil	4·04	3·38	Nil	0·10	1·27	Nil	0·30	12·14
Chedderville	A. May	0·85	0·90	1·05	2·05	0·44	10·31	1·75	2·26	0·21	1·23	Nil	1·25	22·30
Claresholm	School of Agri	0·66	0·31	0·64	0·47	0·19	5·69	4·06	1·84	0·51	0·37	0·58	0·43	15·75
Coaldale	Rev. N. F. Priestley	0·37	0·62	0·50	0·69	0·09	7·00	3·33	1·34	0·16	0·49	0·75	0·37	15·71
Glenwoodville	Glen Wood	1·10	0·50	0·88	0·79	0·15	7·54	4·01	3·29	0·17	0·47	0·25	0·70	19·85
High River	B. F. Kiser	0·60	0·50	1·40	0·70	0·05	6·14	2·11	1·76	0·08	0·07	0·30	0·40	14·11
Jenner	C. Pesse	0·30	0·20	0·08	0·92	0·70	4·26	2·11	0·16	0·26	0·70	0·08	0·40	10·17
Jenner	N. Klein	0·25	0·25	0·15	1·00	1·14	4·87	1·87	0·23	0·07	0·54	0·25	0·25	10·87
Kipp	C. M. Nicol	0·90	1·85	1·10	0·65	0·06	7·62	4·44	1·19	0·23	0·74	0·50	0·30	19·58
Kippenville	L. C. Halmrast	0·50	1·20	1·40	0·70	0·11	6·16	2·12	1·02	Nil	0·40	0·10	0·70	14·41
Lethbridge	Exp. Station	0·94	0·79	0·93	1·32	0·09	6·79	3·98	1·54	0·24	0·85	0·28	0·33	18·08
Lethbridge	R. E. Everest	0·62	0·92	1·12	0·71	0·15	7·85	3·29	1·72	0·30	1·07	0·26	0·50	18·51
Macleod	N. Grier	1·00	0·30	1·20	1·50	Nil	5·75	2·46	1·70	0·45	0·45	0·40	0·30	15·51
Munson	R. R. Fraser	0·30	0·30	0·54	1·35	1·40	4·60	1·67	1·81	0·03	0·20	Nil	0·45	12·65
New Dayton	R. W. Risinger	0·50	1·20	1·25	1·20	0·09	8·46	4·67	1·55	Nil	0·80	0·28	0·33	20·33
Nobleford	E. L. Woodbury	0·43	0·62	0·72	1·02	0·02	7·05	3·60	1·43	0·18	0·46	0·30	0·45	16·28
Orion	Geo. Wagar	0·35	0·88	0·61	1·30	0·50	5·62	1·17	0·62	Nil	0·20	Nil	0·60	11·85
Pincher Creek	A. Christie	1·05	0·55	1·62	1·35	0·27	7·81	2·01	4·31	0·66	0·83	0·15	0·34	20·95
Pincher Creek	J. Palmer	1·10	0·60	1·30	1·15	0·34	7·98	2·60	4·42	0·64	0·89	0·30	0·35	21·67
Raymond	School of Agri	0·50	1·10	0·90	0·70	0·05	6·45	4·08	1·96	0·02	0·77	0·50	0·45	17·48
St. Paul de Metis	H. Therrien	0·05	1·20	0·91	1·17	2·65	1·27	5·04	2·10	1·07	0·60	0·03	0·30	16·39
Sunnynook	R. Montgomery	0·35	0·17	0·10	1·40	0·10	4·92	2·81	Nil	Nil	1·30	Nil	Nil	11·15
Wainright	Geo. C. Boyd	0·05	0·15	0·82	0·65	0·12	1·60	2·25	0·67	0·22	Nil	0·02	0·10	6·65
Whitla	R. H. Babe	0·20	0·80	1·70	1·10	0·95	3·81	2·67	1·28	0·60	0·40	Nil	0·40	13·91
Youngstown	R. Coad	0·25	0·15	0·40	1·00	0·42	4·24	2·41	0·84	0·59	0·55	0·15	Nil	11·00

ANIMAL HUSBANDRY*

HORSES

At the present time there are twenty-six head of horses at the station, fifteen of these are draught mares and geldings used in general work in the various departments of the farm, one driving horse, and one pack horse for use at the sheep camp in the Forest Reserve. There are nine head of registered Percheron females. In 1928 the number of registered stock was increased by the birth of one foal.

Some experimental work in comparison of alfalfa with timothy hay is in progress and data on cost of horse labour are being collected.

CATTLE

FEEDING BEEF CATTLE

In November, fifty-six head of yearling cattle were purchased from James McDougald of Maple Creek, Sask. Thirty-one of these were steers and twenty-five were spayed heifers. The group of cattle were of mixed breeding, thrifty, and of reasonably good beef type. It might be explained that this class of cattle was resorted to because of the scarcity and high price of top notch feeder steers at the time. The lower price at which it was possible to purchase these gave a better opportunity of securing a fair "spread" when finished.

These cattle were "T.B." tested to comply with the regulations of the Federal accredited herds, as the Station dairy herd is accredited.

On December 9; after being weighed individually on three consecutive days the steers were started on feeding trials. The objects of the trials were primarily to determine the cost and feasibility of fattening yearling cattle in feed lot on home grown feeds. Some information was also sought on various classes and combinations of feeds for this purpose, and on the comparative value of steers and spayed heifers for this class of feeding.

The cattle used in this trial were not sold at the end of the trial, as it was felt that a better price would be secured if all of the groups were fed an optimum ration for a short time to give them a better bloom. They were sold on May 18 to P. Burns and Company, Lethbridge.

Outline of Experiment

The cattle were allotted to four groups, as evenly as possible considering weight, breed, type and sex. The various groups were fed as follows:—

Group No. 1. Alfalfa hay, oats and barley meal and boiled barley.
Group No. 2. Alfalfa hay, oat and barley meal.
Group No. 3. Brown alfalfa hay†, oat and barley meal.
Group No. 4. Alfalfa hay, oat hay and oat and barley meal.

Shelter was provided in the form of a straw shed open to the south and a seven foot board fence around the corrals. Water was available at all times and was heated with tank heaters in severe weather. The cattle were fed twice daily. The boiled barley, fed to No. 1, was fed at the rate of two pounds of barley, weighed dry, per day to each steer.

* The work with live stock is under the supervision of Arthur Newman, B.S.A., whose material assistance in the preparation of the report under this heading is gratefully acknowledged. Mr. Newman also has the supervision of the dry-land rotation and cultural work.

† Brown hay is a term applied to alfalfa cut and stacked the same day, being allowed to undergo a process of fermentation in the stack.

The following tables give the results of the feeding trial:—

CATTLE FEEDING TRIALS, 1927-1928, DECEMBER 9 TO MARCH 30

—		Group 1 alfalfa hay, oat and barley meal, boiled barley	Group 2 alfalfa hay, hay, oat and barley meal	Group 3 brown alfalfa hay, oats and barley meal	Group 4 alfalfa and oat hay, oats and barley meal
Number cattle at beginning of trial		13	13	13	13
Number cattle at end of trial		11	10	11	11
Number days in trial		112	112	112	112
Number cattle days in trial		1,359	1,385	1,374	1,409
Total initial weight	lb.	10,607	10,707	10,683	10,704
Average initial weight	lb.	822·8	823·6	821·8	823·4
Total final weight	lb.	12,685·0	12,375·0	12,085·0	12,420·0
Total gain for period	lb.	1,988·0	1,668·0	1,402·0	1,716·0
Average gain per head	lb.	163·9	134·8	114·3	136·4
Average gain per head per day	lb.	1·46	1·20	1·02	1·22
Cost values					
Average cost steer per head at 6·5 cents	$	53 48	53 53	53 41	53 52
Feed values					
Alfalfa hay at $10 per ton	lb.	20,390	20,000	.....	11,670
Brown alfalfa hay at $8 per ton	lb.	.....	.....	26,610	.....
Oat hay at $10 per ton	lb.	.....	.....	.....	9,030
Oats at $32.35 per ton	lb.	4,069	4,069	4,069	4,069
Barley at $30 per ton	lb.	6,669	6,669	6,669	6,669
Boiled barley	lb.	2,940	.....	.....	.....
Average cost of feed	$	25 76	21 52	22 21	21 44
Cost to produce 1 pound gain	$	0 157	0 159	0 194	0 157
Average cost of steer and feed	$	79 24	75 05	75 62	74 96
Appraised selling price	$	9 60	9 40	9 20	9 50
Average value per steer	$	94 36	90 43	85 99	91 18
Profit per head	$	15 12	15 38	10 37	16 22

The foregoing table would indicate that due to the liberal spread between buying and selling price, which amounted to an average of 2·95 cents over all groups, cattle feeding was a profitable enterprise during the winter of 1927-1928.

Gains were materially increased by the feeding of boiled barley in Group No. 1, while Group No. 4 receiving a mixed roughage which widened the nutritive ratio, returned the largest profit.

Brown Hay

Brown hay, as has been previously explained is alfalfa hay which has been cut, allowed to wilt slightly in the swath, and then put in the stack where it undergoes a process of fermentation similar to that which ensilage goes through, does not appear to promote a thrifty condition in cattle in spite of the fact that they are very fond of it and eat it with apparent relish. This may be due to a certain amount of mustiness which appears around the edge of the stack, although the centre of the stack is a dark brown and moist.

Finishing Yearling Cattle

It is generally conceded that finishing yearling cattle requires a greater amount of skill than does finishing older cattle, the problem being to induce fattening rather than the utilization of the feed for growth.

Our observations during the feeding trial would indicate that one of the most important factors in finishing young cattle is the type of animal, the low set, thick bodied animal fattening more readily than the more rangy type of animal. Another very important factor is the feed, alfalfa hay being a feed of a high protein content, and more inclined to produce growth rather than fattening, makes a good roughage for finishing this class of feeders only when supplemented by liberal quantities of carbonaceous feed such as barley, or when it is supplemented by a more fattening roughage such as oat hay.

FEED REQUIREMENTS FOR ONE POUND OF GAIN

—	Group No. 1	Group No. 2	Group No. 3	Group No. 4
Oats..... lb.	2·05	2·44	2·90	2·37
Barley..... lb.	3·35	4·00	4·76	3·89
Alfalfa..... lb.	10·26	11·99	18·98	6·80
Oat hay..... lb.	.....	.....	.....	5·26
Boiled barley..... lb.	1·48	.....	.....	.....
Total digestible nutrients..... lb.	10·572	11·081	15·615	10·707
Nutritive ratio.....	1 : 5·14	1 : 4·93	1 : 5·73	1 : 5·96
Average daily gain..... lb.	1·46	1·20	1·02	1·22
Feed cost to produce one pound of gain..... $	0 157	0 159	0 194	0 157

Spayed Heifers vs. Steers

The following table gives a comparison of the spayed heifers in all groups with a like number of steers. These figures cover the entire period that the cattle were on the farm and not merely the days of the feeding trial.

—	Steers	Spayed heifers
Number considered.....	15	15
Weight December 8..... lb.	12,897	12,070
Weight May 11..... lb.	15,650	14,600
Total gain 155 days..... lb.	2,753	2,530
Average gain 155 days..... lb.	183·51	168·60
Average gain per day..... lb.	1·18	1·09

This table would indicate that the steers made more rapid gains than the spayed heifers. It was noticeable however that the spayed heifers showed more smoothness of finish and bloom at the end of the period than did the steers. As heifers and steers were fed in the same group, comparative cost figures are not available for this class.

DAIRY CATTLE

The herd of pure bred Holstein-Friesian cattle has made some progress from the standpoint of a better and more uniform type, and a general higher production, although the numbers have not increased even with a splendid crop of heifer calves in 1928 and the purchase of two cows, Spruce Farm Bertha —125322—, and Spruce Farm Queen —124357—, from Mr. C. Parry of Lethbridge.

On December 31, 1927, the pure bred herd consisted of twenty-six females and the herd sire. On the same date in 1928 the herd consisted of twenty-three pure bred females, the herd sire and one young bull. During the year three head were disposed of because of undesirable type, and six head were lost to the herd for pathological reasons, and will be dealt with later.

HEALTH OF THE DAIRY HERD

During the winter of 1928 the herd suffered considerable losses from pathogenic causes. Flora Korndyke Bell died from peritonitis, due to partial retention of the placenta. Two yearling heifers died and one was seriously stunted from causes not definitely ascertained, but apparently some form of forage poisoning was responsible. Trouble from hemorrhagic septicemia and botulism were common in the district, due, possibly, to the continued inclement weather of late summer and early autumn of 1927 with resultant damage to forage.

PRODUCTION AND GENITAL DISEASES

The entire herd was subjected to serum tests for bacillus abortus of Bang, the organism credited with being responsible for a large percentage of bovine abortion.

Two cows giving positive reactions to the serum tests were removed to the Veterinary Research Station of the Health of Animals Branch, Lethbridge, for further observation by Dr. L. M. Heath, by whose co-operation the work is being carried on, thus leaving the station herd entirely free from reactors.

BREEDING EFFICIENCY

Taking the production of a normal healthy calf by every cow of breeding age, every twelve months as one hundred per cent breeding efficiency, the Station herd has reproduced at 84·6 per cent efficiency, in that eleven of the thirteen cows of breeding age have produced healthy calves within twelve months of the previous calf or of coming of breeding age, one of the delinquents having aborted and the other is apparently sterile due to ovary trouble.

MILK PRODUCTION RECORD FOR ALL COWS MILKING OVER 2 MONTHS IN 1928

Name of Cow	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Francy Canaan Beauty 71719	2,246·5	1,928	1,878·5	1,693·2	1,670·2	1,536·9	1,463·2	1,205·6	1,167	355·5	.....	.....	15,144·6
L.E.S. Ianthe Aagie De Kol 70079	2,111	1,897	1,896·5	1,878	1,890·9	1,610	1,630	1,324·2	990	919·5	860·3	779	17,786·4
L.E.S. Korndyke Heibon 91372	1,832	1,585·2	1,602·5	1,300	1,401·7	1,421·3	1,224·5	995	709·5	525	20·5	160·5	12,777·7
Korndyke Canaan Beauty 115160	.....	.....	1,277	2,060	2,005·2	1,949	1,783	1,666·3	1,074·5	994·5	881·3	589	14,279·8
Korndyke Rose L.E.S. 122976	468·5	397·5	359·5	85	.....	429·6	1,932	1,876·3	1,513	1,357	1,176·4	992·6	10,587·4
Bess Hengerveld 63936	1,776	1,566·5	1,566·4	1,581·5	1,566·5	1,396·9	843·7	369·3	.....	.....	.....	.....	10,666·8
Spruce Farm Bertha 125322	.....	.....	.....	1,001	2,307·3	2,745·2	2,229·5	2,030·9	1,860	1,565	1,371·9	1,183	16,293·8
L.E.S. Ianthe Korndyke Ormsby 135514	455·5	.....	.....	.....	154	1,640·5	1,755·7	1,694·9	1,346	1,235	1,126·8	897	10,305·4
Mooley (Grade No. 1)	1,518·5	1,307·5	1,338	1,166	1,077·2	1,222·4	1,037	1,038	366·5	.....	929	1,506	12,506·1
Rean (Grade No. 2)	690	395·5	.....	.....	957·2	1,228·9	1,210·5	1,190·3	1,014	810·5	903·5	783·5	9,183·9
Total production													129,531·9
Average production													12,953·19

MILK PRODUCTION

The foregoing chart gives the milk produced by each cow in the herd which milked for more than two months of the calendar year. This excludes such cows as were sold in February or young cows freshening after October. Cows producing heavily were milked three times daily, at five a.m., one p.m. and nine p.m.

The average herd production of 12953·19 pounds of milk is a decided increase over the average production for 1927, due largely to the herd containing a more mature group of cows than was the case in 1927.

REVENUE FROM DAIRY COWS NOT COUNTING VALUE OF CALVES

Average milk per cow	lb.	12,953·19
Average per cent butter fat	%	3·52
Average pounds fat per cow	lb.	455·91
Average value of fat per cow at 40 cents per pound	$	182 36
Average value of skim milk at 25 cents per pound	$	31 25
Total revenue from each cow from milk produced	$	213 61

COST OF FEED FOR DAIRY COWS

The milking cows were fed at the rate of one and one-half pounds of alfalfa hay and three pounds of corn ensilage for each one hundred pounds of live weight, and one pound of grain (oats and barley equal parts) for each three and a half pounds of milk produced. During periods of rest they were fed liberally to fit them for the following lactation period. All of the feeds used for the dairy cows were farm grown except a small amount of bran, which was fed at the time of freshening, and a little oil cake meal and bone meal, which was used to supplement the ration of cows producing over ninety pounds of milk per day. Beet molasses was fed over a thirty day feeding trial.

Following is an itemized account of the average feed per cow and a statement of cost:—

Alfalfa hay, 2·33 tons at $10 per ton	$ 23 30
Corn ensilage, 4·07 tons at $3.50 per ton	14 25
Oat and barley meal, 1·86 tons at $34.25 per ton	63 70
Bran, 33·60 pounds at $30 per ton	0 50
Bone meal, 10 pounds at $100 per ton	0 50
Salt, 36 pounds at $30 per ton	0 54
Beet molasses, 60 pounds at $20 per ton	0 60
Pasture, 132 days at 5 cents per day	6 60
Total feed charge	$ 109 99

FINANCIAL RETURNS FROM DAIRY HERD

Average returns per cow	$ 213 61
Average feed cost per cow	109 99
Average return over cost	$103 62

The above figures are based on creamery prices for butterfat and on elevator prices for grain feed. Hence the farmer with grain for sale would receive a larger labour profit than is recorded due to a lower grain value. The Experimental Station has, however, one advantage over many farmers in that the facilities for keeping milking utensils in a good clean condition and the cream cool are better, hence a higher grade and higher price for the butterfat.

The above figures do not include charges for interest on investment, depreciation of herd, or building and equipment charges. This is much more than paid for by the value of the calves.

BEET MOLASSES FOR DAIRY COWS

The milking herd was fed beet molasses experimentally. The double reversal system of experimental feeding was used; the procedure being to feed beet molasses at the rate of two pounds per day to each cow for a period of fourteen days, and then allow an interval of fourteen days to elapse before again feeding the molasses for another fourteen day period. The trial extended over February and March. The results were negative and would indicate where cows are receiving a liberal, well balanced ration the production is not increased by the use of this feed.

CREAM GRADES AND PRICES RECEIVED

The cream delivered to the local creamery during 1928 graded as follows:—

"Table" 58·5 per cent.
"Special" 29·5 per cent.
"No. 1" 12·0 per cent.

The two top grades are interchangeable in that the creameries are not required to grade cream "Table" unless they have a market for it as "Table Cream".

The average prices received for butterfat sold from the farm were as follows, April to September, inclusive:—

"Table" Cream 41·44 cents per pound.
"Special" Cream 37·15 cents per pound.
"No. 1" Cream 35·56 cents per pound.

October to March, Inclusive

"Table" Cream 46·67 cents per pound.
"Special" Cream 42·27 cents per pound.
"No. 1" Cream 39·00 cents per pound.

COST OF RAISING DAIRY CALVES

The following data were collected on the cost of raising a group of nine head of dairy calves. The calves considered in the tabulation following were born in the autumn of 1927 and averaged thirty-eight days of age on January 1, 1928.

METHOD OF FEEDING.—Whole milk was fed for the first month starting with a quantity equal to five per cent of the body weight of the calf and was gradually increased according to the ability of the individual calf to handle the feed. Skimmed milk gradually replaced whole milk and was fed at a rate up to eighteen pounds per day until April 20, at which time the calves were put on a mixture of feeds which has been worked out at the Station and found very satisfactory in promoting growth and thriftiness in young calves in the absence of milk feeds. The mixture consisted of oats (whole or rolled) 150 pounds, bran 50 pounds, molasses 10 pounds, oil cake meal 25 pounds, and tankage 6 pounds. Whole oats and alfalfa hay were fed from the time the calves would eat these feeds.

On June 2, they were put on pasture, the above mixture being continued at the rate of two pounds per day. At the end of the grass season they were on stubble pasture for a period of fourteen days, after which the pasture was supplemented by silage at the rate of four pounds daily and grain at the rate of two pounds per day. In December they were put into winter quarters, a paddock with straw shed for shelter, and were fed alfalfa hay, corn silage eight pounds daily, and grain at the rate of two pounds per day.

QUANTITY AND VALUE OF FEEDS CONSUMED BY NINE CALVES FROM BIRTH TO JANUARY 1, 1929, WHEN THEY AVERAGED 13 MONTHS OF AGE

Whole milk, 6,750 pounds at $1.40 per cwt	$94 50
Skimmed milk, 11,988 pounds at 25 cents per cwt	29 97
Experimental Farm calf mixture, 2,751 pounds at $2.50 per cwt	68 78
Oats, 2,651 pounds at $1.65 per cwt	43 74
Ensilage, 3,280 pounds at $4 per ton	6 56
Alfalfa hay, 4,930 pounds at $10 per ton	24 65
Salt, 20 pounds at $30 per ton	0 30
Pasture, 102 days at 2·5 cents per head per day	22 95
Stubble pasture, 14 days at 2·5 cents per head per day	3 15
Total feed cost	$294 60
Average feed cost per calf	$ 32 73

The calves developed into well grown, thrifty heifers.

SHEEP

LAMB FEEDING TRIALS

The lamb feeding work during the winter of 1927-28 was a duplication of the trials of the previous two years which have been carried on with a view to determining the most economical amount of grain to feed to fattening lambs with alfalfa hay. Only three different feeding trials were conducted although four pens were fed; two of them were duplicates of the half-grain ration test and check so well as to gain and costs that only one need be reported.

The lambs on trial were the smallest of the wether lambs selected from our lamb crop of 1927. They were March and April lambs which had been ranging on the Crows Nest Forest Reserve, during the summer. Shropshire breeding predominated, although there were some lambs of Rambouillet and Corriedale breeding.

The various groups were fed as follows:—

Group No. 1. Alfalfa hay, one-half grain ration.
Group No. 2. Alfalfa hay, two-thirds grain ration.
Group No. 3. Alfalfa hay full grain ration.

The lambs were weighed into the feed lots at 9·5 cents per pound, weighing an average per head of 75·69 pounds, on December 2, 1927. On February 4, 1928, they were sold and graded by the purchaser into "tops" and "medium" lambs; the "tops" sold for $12.60 per cwt., and the "mediums" for $11.60 per cwt., Mr. P. V. Lewis of Lethbridge being the purchaser.

LAMB FEEDING TRIALS

December 2, 1927 to February 4, 1928

Items		Group 1 — Alfalfa hay one-half grain ration	Group 2 — Alfalfa hay two-thirds grain ration	Group 3 — Alfalfa hay full grain ration
Number of lambs on trial		50	50	50
Number of days in trial		64	64	64
Total initial weight	lb.	3,783·3	3,786·3	3,783·3
Average initial weight	"	75·66	75·73	75·66
Total final weight	"	4,460	4,810	4,870
Average final weight	"	89·2	96·2	97·4
Total gain per group	"	676·7	1,023·4	1,086·7
Average gain per lamb	"	13·54	20·47	21·73
Average daily gain	"	0·21	0·32	0·34
Quantity of Feed Consumed				
Oats	lb.	900	1,132	1,680
Barley	"	2,300	2,980	3,650
Total grain consumed	"	3,200	4,112	5,330
Grain per lamb	"	64	82·2	106·6
Total hay consumed	"	6,940	6,630	5,820
Hay per lamb	"	138·8	132·6	116·4
Salt per group	"	45	45	45
Value of Feeds				
Hay at $10 per ton	$	34 70	33 15	29 10
Oats at $32.35 per ton	$	14 56	18 31	27 17
Barley at $30 per ton	$	34 50	44 70	54 75
Salt	$	0 68	0 68	0 68
Total cost of feed	$	84 44	96 84	111 70
Cost and Value of Lambs				
Number of top lambs at end of trial		15	37	38
Weight of top lambs	lb.	1,440	3,640	3,850
Value of top lambs at $12.60	$	181 44	458 64	485 10
Number of medium lambs at end of trial		35	13	12
Weight of medium lambs	lb.	3,020	1,170	1,020
Value of medium lambs at $11.60	$	350 32	135 72	118 32
Total value of all lambs	$	531 76	594 36	603 42
Cost of lambs December 2 at $9.50	$	359 41	359 73	359 41
Cost of feed	$	84 44	96 84	111 70
Total cost of feed and lamb	$	443 85	456 57	471 11
Average cost of feed per lamb	$	1 69	1 94	2 23
Profit over feed	$	87 91	137 79	132 31
Profit over feed per head	$	1 76	2 76	2 65
Cost to produce 1 pound of gain	$	0 12	0 09	0 10

The lambs were started on feed at a quarter of a pound of grain per day, the amount being increased gradually until the No. 3 group was receiving two pounds per day, this being all that they would consume without digestive troubles. Groups No. 1 and No. 2 received one-half and two-thirds respectively of the amount of grain fed group No. 3.

The data contained in the foregoing table show group No. 2, receiving two-thirds of a full grain ration, as returning the greatest profit. This is due in part to a lower cost of production per pound of gain in group No. 2 as compared to group No. 3, where a full grain ration was fed, or to group No. 1 where only a half grain ration was fed. In group No. 2 as compared to group No. 3, 1·12 pounds of alfalfa hay at 0·5 cent replaced 0·89 pound of grain at 1·6 cents per pound for each pound of gain produced, thus effecting a reduction in cost of production nearly one cent for each pound of gain. Group No. 1 required

0·71 pound of grain and 3·78 pounds of hay more for each pound produced than did group No. 2, where a more liberal grain ration was fed. It would appear that one-half grain ration or approximately one pound per day is not sufficient to make economical gains on lambs when fed with alfalfa hay.

Group No. 2 had an advantage in this trial, which has not been usual in similar trials, in that while thirty-eight lambs of the full fed group were graded " tops ", thirty-seven lambs from the two-thirds group were also graded " tops ", in this way raising the average selling price for the group.

Following is a summary of three years' work on various amounts of grain fed in conjunction with alfalfa hay to fattening lambs.

SUMMARY OF THREE YEARS FEEDING TRIALS

	Group 1 alfalfa hay one-half grain ration	Group 2 alfalfa hay two-thirds grain ration	Group 3 alfalfa hay full grain ration
1925 AND 1926			
Number of lambs on trial	48	49	50
Number of days in trial	90	90	90
Average daily gain lb.	0·31	0·37	0·40
Number of top lambs	17	22	37
Number of medium lambs	31	27	13
Cost to produce 1 pound gain cts.	7·8	6·8	7·5
Profit per lamb over feed $	0 68	1 36	1 47
1926 AND 1927			
Number of lambs on trial	50	50	50
Number of days in trial	92	92	92
Average daily gain lb.	0·25	0·32	0·40
Number of top lambs	12	27	44
Number of medium lambs	38	23	6
Cost to produce 1 pound gain cts.	12·0	10·0	9·4
Profit per lamb over feed $	0 77	1 37	1 70
1927 AND 1928			
Number of lambs on trial	50	50	50
Number of days in trial	64	64	64
Average daily gain lb.	0·21	0·32	0·34
Number of top lambs	15	37	38
Number of medium lambs	35	13	12
Cost to produce 1 pound gain cts.	12	9	10
Profit per lamb $	1 76	2 76	2 65

The results of three years' work are very conclusive evidence that greatest profits are obtained when lambs are fed a liberal grain ration up to two pounds per day.

CORRIEDALE IMPORTATION

In September, 1928, there reached the Station a consignment of registered Corriedales from New Zealand, composed of one eleven months old Corriedale ram, bred by H. T. Little, Hui Hui Hawarden, New Zealand, which was a well-grown, rugged individual, compact in type, with excellent length and quality of staple in the fleece, and five Corriedale ewes just under one year of age. The latter were a particularly uniform group combining good mutton conformation, with a fleece exhibiting unusual length of staple combined with good quality and reasonable density. The ewes were bred by Mr. O. T. Evans, Christchurch, New Zealand.

PASTURING SHEEP ON FOREST RESERVE

This is an experiment that has been under way for the last nine years, and as has been explained in previous reports, its object being to determine the feasibility of alfalfa growers on irrigated land utilizing the nearby forest reserve

in the Rocky mountains for summer pasturing of sheep. On the irrigated farms in the district there is always an abundance of winter feed, but it is difficult to obtain cheap summer pasture on the relatively high-priced irrigated land, while on the forest reserve there is always a vast amount of pasture, peculiarly adapted for sheep, that goes to waste each season. Owing to the difficulty and probable impracticability of trailing sheep from farms in the Lethbridge district to the mountain ranges, it was necessary to arrange to ship the sheep by rail to and from the summer range. The obviously heavy expense entailed by so doing was taken into consideration in planning the experiment, but the results of the nine seasons indicate that the plan is both practical and profitable.

During the fall and winter months the band is either run on stubble fields or fed at the Station, the amount of feeding required depending upon the severity of the weather. During the summer months from early June till late in September they are pastured in the Crowsnest forest reserve, being shipped by rail from Lethbridge to Sentinel, near Coleman, and returned by rail again in the fall. The ewes are bred to lamb fairly early; that is to start lambing about the middle of March. In order to accommodate them during the lambing period a shed 140 feet by 64 feet is used. As the grass in the forest reserve, as a rule, is ready for pasturing early in June, it has been the custom to shear the sheep in May. After shearing they are dipped and shipped to the mountains during the first week in June. The sheep are returned to Lethbridge during either the last week in September or the first week in October. October, 1928, completed the ninth year of the experiment, and the statement that follows gives the details of the expenses and returns during the period from October, 1927, to October, 1928, and shows that a gross profit of $1,776.35 was made during that time.

Expenses October, 1927, to October, 1928:—		
Winter pasture on stubble fields		$ 398 00
Alfalfa hay, 130 tons at $10		1,300 00
Silage, 70 tons at $4		280 00
Coarse grain, 44,000 pounds at $1.35 per cwt		594 00
Salt, 2½ tons at $28		70 00
Summer pasture on Forest Reserve		77 00
Total freight to and from Forest Reserve		663 13
Shearing		165 75
Purchase of rams		75 00
Labour, total for 12 months (estimated)		2,000 00
		$ 5,622 88
Inventory, October, 1927:—		
Number of ewes to be bred, 885 at $13		$ 11,505 00
Number of ewe lambs on hand, 127 at $8.50		1,079 50
Number of feeder lambs on hand, 203 at $7.25		1,471 75
Number of rams on hand, 21 at $30		630 00
		$ 14,686 25
Sales:—		
119 aged ewes		$ 1,258 00
Aged rams		30 00
Lambs, net receipts		2,575 35
Net wool receipts, less dip and supplies		1,850 03
		$ 5,713 38
Inventory, October, 1928:—		
Number of ewes to be bred, 797 at $13.25		$ 10,560 25
Number of ewe lambs on hand, 435 at $8.50		3,697 50
Number of feeder lambs on hand, 263 at $7.20		1,893 60
Number of rams on hand, 21 at $25		525 00
		$ 16,676 35
Financial summary:—		
Sales for year	$ 5,713 38	
Inventory, October, 1928	16,676 35	
Expenses for year		$ 5,622 88
Inventory, October, 1927		14,686 25
Gross profit for season		2,080 60
	$ 22,389 73	$ 22,389 73

DETAILS OF THE TEST FROM OCTOBER, 1927, TO OCTOBER, 1928

The sheep reached Lethbridge from the forest reserve on October 5, 1927, and were put on stubble fields. The lambs were disposed of, except 263 wether lambs for feeders and 127 ewe lambs saved for the maintenance of the breeding flock. The band was carried on stubble fields in the neighbourhood rented for the purpose until March. Hay was fed in stormy weather when it was impossible for the sheep to get to the ground. The price paid for the stubble pasture was at the rate of $4.50 per day per thousand head. Days when it was not possible for the sheep to pasture, and they had to be fed hay, were not counted. Shearing was begun on May 2 and finished May 7. The sheep were all dipped, lambs included, on May 25, and on June 7 were branded.

On June 4, 1928, the sheep were shipped to the forest reserve at Sentinel, Alta., the first siding east of Crowsnest Station. There were included in the shipment 944 ewes and 821 lambs. The sheep reached Lethbridge from the mountains October 4. The losses during the summer were much greater than usual. Practically all of these resulted during one night when coyotes frightened the sheep at their bed ground, and before the herder could drive the marauders away the sheep had " piled ". When matters had straightened out and the sheep quieted down it was found that several lambs and a few ewes had been tramped to death. The total losses for the summer were 24 ewes and 51 lambs.

FINANCIAL SUMMARY COVERING PERIOD FROM OCTOBER, 1919, TO OCTOBER, 1928

For the Year ending October, 1920

Sales for year	$ 4,864 62	
Inventory, October, 1920	7,431 00	
Expenses for year		$ 6,572 08
Inventory, October, 1919		10,050 00
Loss	4,326 46	
	$ 16,622 08	$ 16,622 08

For the Year ending October, 1921

Sales for year	$ 3,635 07	
Inventory, October, 1921	7,898 00	
Expenses for year		$ 4,452 19
Inventory, October, 1920		7,431 00
Loss	350 12	
	$ 11,883 19	$ 11,883 19

For the Year ending October, 1922

Sales for year	$ 4,248 02	
Inventory, October, 1922	9,839 35	
Expenses for year		$ 4,722 88
Inventory, October, 1921		7,898 00
Profit		1,466 49
	$ 14,087 37	$ 14,087 37

For the Year ending October, 1923

Sales for year	$ 9,980 38	
Inventory, October, 1923	10,357 00	
Expenses for year		$ 5,210 39
Inventory, October, 1922		9,839 25
Profit		5,287 74
	$ 20,337 38	$ 20,337 38

For the Year ending October, 1924

Sales for year	$ 10,530 40	
Inventory, October, 1924	14,515 00	
Expenses for year		$ 5,881 78
Inventory, October, 1923		10,357 00
Profit		8,806 62
	$ 25,045 40	$ 25,045 40

For the Year ending October, 1925

Sales for year	$ 13,035 92	
Inventory, October, 1925	14,705 00	
Expenses for year		$ 6,222 95
Inventory, October, 1924		14,515 00
Profit		7,002 97
	$ 27,740 92	$ 27,740 92

For the Year ending October, 1926

Sales for year	$ 10,469 35	
Inventory, October, 1926	13,523 50	
Expenses for year		$ 6,274 28
Inventory, October, 1925		14,705 00
Profit		3,013 57
	$ 23,992 85	$ 23,992 85

For the Year ending October, 1927

Sales for year	$ 9,246 09	
Inventory, October, 1927	14,686 25	
Expenses for year		$ 6,299 56
Inventory, October, 1926		13,523 50
Profit		4,109 28
	$ 23,932 34	$ 23,932 34

For the Year ending October, 1928

Sales for year	$ 5,713 38	
Inventory, October, 1928	16,676 35	
Expenses for year		$ 5,622 88
Inventory, October, 1927		14,686 25
Profit		2,080 60
	$ 22,389 73	$ 22,389 73

Nine Years' Results

Total sales	$ 71,723 83	
Increases inventory, October, 1928, over inventory, October, 1919	6,626 35	
Total expenses		$ 51,258 99
Total gross profit		27,091 19
	$ 78,350 18	$ 78,350 18

SWINE

The breeding herd of pure-bred Yorkshire swine has been increased to twenty sows. The senior herd sire, Ottawa Beau 17 —119713—, has been a big factor in the marked improvement which has been effected in the quality of the herd. A junior herd sire, Brandon A.F. 348 —130247—, has been secured from the Mental Hospital, Brandon, Man., to use on the progeny of the senior herd sire. He promises to develop into a desirable type of animal.

Hogs on the Station on December 31, 1928, numbered 194, as compared with 157 a year previous. During 1928, ninety-eight market hogs were sold, averaging 203·2 pounds, and returned a total revenue of $1,739.65, the price range on selects running from 8 cents to 12·75 cents.

In connection with the policy of the farm to sell registered breeding stock at moderate prices to farmers, especially where the demand is not being supplied by private breeders, thirty head were distributed during the year.

EXPERIMENTAL WORK WITH SWINE—WINTER TRIALS

In February, four groups of pigs of December farrowing were started on experiment. The object was to determine the value of the following practices in swine feeding:—

Group 1. Feeding grain and skimmed milk.

Group 2. Feeding grain, tankage and skimmed milk.

Group 3. Feeding grain and tankage.

Group 4. Feeding grain, fish meal and skimmed milk.

The grain used was oats and barley meal. The proportion of barley in the mixture was increased with the weight of the pigs.

The pigs were weighed on three consecutive days to secure the initial weight. All pigs were tagged and weighed individually.

WINTER FEEDING TRIALS, JANUARY TO JUNE, 1928

Items		Group 1 Grain and skimmed milk	Group 2 grain and tankage skimmed milk	Group 3 grain and tankage	Group 4 grain and fishmeal skimmed milk
Average number of days in trial		142	142	143	127
Number of hogs in trail		6	8	8	8
Total initial weight	lb.	184	263	258	267
Average initial weight	lb.	30·7	32·9	32·3	33·4
Total final weight	lb.	1,214	1,472	1,398	1,624
Average final weight	lb.	202·3	184	174·8	203
Total gain in period	lb.	1,030	1,209	1,140	1,357
Average gain in period	lb.	171·6	151·1	142·5	169·6
Average daily gain	lb.	1·21	1·06	1·00	1·34
Feed Consumed					
Oats	lb.	2,962	3,185	3,030	3,050·5
Barley	lb.	2,979	3,280	3,090	2,976
Tankage	lb.	.....	340	680	.....
Skimmed milk	lb.	4,720	5,640	.....	5,085
Fishmeal	lb.	.....	.....	.....	317·5
Total grain consumed	lb.	5,941	6,465	6,120	6,026·5
Grain for 100 pounds gain	lb.	576·8	534·7	536·8	444·1
Supplement for 100 pounds gain—					
Tankage	lb.	.....	28·1	59·6	.....
Skim-milk	lb.	458·3	466·5	.....	374·7
Fishmeal	lb.	.....	.....	.....	23·4
Average number of days from birth to marketing		208·5	210·5	215·4	199·3

The intrepretation of the results from the foregoing trials presents some difficulty in view of group No. 1, receiving skimmed milk, requiring a larger amount of grain to produce one pound of gain, than group No. 3, with a straight tankage supplement. Ordinarily skimmed milk has proven to be the best single supplement to the grain ration, particularly for younger hogs, tankage usually showing up to better advantage in more mature hogs or in the finishing stage.

Groups No. 2 and No. 4 give results comparable with what would be expected from the feeds, mixed supplements, skimmed milk and tankage, and skimmed milk and fish meal, respectively. Our results from mixed protein supplements have invariably been better from the standpoint of rapidity of gain than with a single supplement; although the economy of such practice depends upon the cost and available supply of such feeds.

Fish meal and skimmed milk in combination with the grain ration have invariably given most rapid gains.

SUMMER FEEDING TRIALS

On April 26 four groups of weanling pigs were started on feeding trials with the object of gathering data on the following supplements to the grain ration of oats and barley meal.

Group No. 1. Lime 2 per cent, oil cake meal 10 per cent.

Group No. 2. Oil cake meal 10 per cent.

Group No. 3. Tankage 3 per cent, skim-milk 5 pounds daily.

Group No. 4. Fish meal 3 per cent, skim-milk 5 pounds daily.

The pigs on the summer feeding trial were fed in dry lot without pasture or soiling crops, with hog cabin for shelter. The following table shows the results in tabulated form.

SUMMER FEEDING TRIALS APRIL 26 TO SEPTEMBER 27

Items		Group 1 oats and barley, oilcake-meal, lime	Group 2 oats and barley, oilcake-meal	Group 3 oats and barley, tankage, and skim-milk	Group 4 oats and barley, fishmeal, skim-milk
Number of pigs on trial		8	7	8	8
Number of days in trial		154	154	154	154
Total initial weight	lb.	263	243	275	260·8
Average initial weight	lb.	32·9	34·7	34·4	32·6
Total final weight	lb.	787	926	1,396	1,605
Average final weight	lb.	98·4	132·29	174·5	200·6
Total gain in period	lb.	524	683	1,121	1,344·2
Average gain in period	lb.	65·5	97·6	140·1	168
Average daily gain	lb.	0·43	0·63	0·91	1·09
Feed Consumed					
Oats at 1·6 cents per pound	lb.	2,932	2,765	2,599·3	2,599·3
Barley at 1·35 cents per pound	lb.	1,784	1,826	2,476·1	2,476·1
Oilcake meal at 2·5 cents per pound	lb.	470	440	.....	.....
Lime at 1 cent per pound	lb.	94	.....	.....	.....
Salt at 1·5 cents per pound	lb.	27	27	26·25	26·25
Tankage at 2·75 cents per pound	lb.	.....	.....	152·1	.....
Skim- milk at 0·25 cents per pound	lb.	.....	.....	5,340	5,680
Fish meal at 5 cents per pound	lb.	.....	.....	.....	152·1
Oats and barley per pound of gain	lb.	9·0	6·7	4·5	3·8
Oilcake meal per pound of gain	lb.	0·90	0·64	.....	.....
Lime per pound of gain	lb.	0·18	.....	.....	.....
Salt per pound of gain	lb.	0·051	0·039	0·230	0·02
Skim-milk per pound of gain	lb.	.....	.....	4·76	4·23
Tankage per pound of gain	lb.	.....	.....	0·136	.....
Fish meal per pound of gain	lb.	.....	.....	.....	0·113
Cost to produce 1 pound of gain	cts.	16·06	11·71	8·24	7·27

As is obvious from the results of the summer feeding trials the addition of 2 per cent of lime to the ration of growing pigs is not an advantage. Commercial plants feeding feeder hogs have reported good results from this addition

to the ration. Both groups No. 1 and No. 2 were taken off the trial as lights, not having reached the market weight in 154 days from weaning. Oil cake without the lime, however, was decidedly superior to the ration in Group No. 1 where lime was fed.

The tankage—skim-milk and fish meal—skim-milk groups made gains, although not particularly rapid, with low grain requirements.

The summer feeding trials as evidenced by the lower amount of grain required to produce one pound of gain, bear out the findings of previous work with regard to the value of mixed protein supplements from the standpoint of rapidity of gains and reduced grain requirements per pound of gain.

FEEDING LOW GRADE FROSTED WHEAT

Owing to the large quantities of frosted low grade wheat prevalent in the fall of 1928, an experiment was conducted to test its value as a feed for finishing hogs. Sixteen hogs of pure bred Yorkshire breeding were selected. They were of good quality, thrifty and averaged one hundred and twenty-seven pounds each on the 5th of November, when the test started. They were divided into two groups of equal weight and quality. Group No. 1 was fed equal parts oats and wheat, while group No. 2 was fed damaged wheat as the only grain. The ration of both lots was supplemented by an addition of 8 per cent of digester tankage. The pigs were housed in portable hog cabins which were covered with straw and provided with a small run.

Following are the results of the trial in tabulated form:—

WHEAT ALONE VS. WHEAT AND OATS

Items		Group 1 feed wheat oats and tankage	Group 2 feed wheat and tankage
Number of hogs on trial		8	8
Number of days in trial		60	60
Total initial weight	lb	1,016·0	1,017·0
Average initial weight	lb	127·0	127·1
Total final weight	lb	1,634·0	1,648·0
Average final weight	lb	204·2	206·0
Total gain per period	lb	618·0	631
Average gain per head per period	lb	77·2	78·9
Average gain per head per day	lb	1·29	1·31
Feed consumed—			
Oats consumed	lb	1,832	
Feed wheat	lb	1,832	3,800
Tankage	lb	293	304
Grain required to produce 1 lb. gain	lb	5·92	6·0
Feed values—			
Oats at 50 cents per bushel, $29.40 per ton	$	26 93	
Feed wheat 60 cents per bushel, $20 per ton	$	18 32	38 00
Tankags at $55 per ton, 2·7 cents per pound	$	7 91	8 21
Total cost of feed for group	$	53 16	46 21
Cost to produce 100 pounds gain	$	8 60	7 32
Average initial value of pigs Nov. 5, at $7.90	$	10 03	10 04
Average cost of feed	$	6 64	5 78
Cost of hog and feed	$	16 67	15 81
Selling value at $8.90 Jan. 5	$	18 17	18 33
Labour profit per hog	$	1 50	2 52

The foregoing data reveal that in this case feed wheat, while requiring a slightly greater amount to produce a pound of gain, produced gains slightly more rapidly and at a much lower cost due to the relatively lower cost of the ration, than was the case where oats and feed wheat were fed half and half. The pigs

in group 2 returned labour profit, or revenue over initial cost of pigs and cost of feed, of $2.52, as compared with $1.50 in the case of the oat and wheat mixture. The wheat fed to the hogs in group 2, and sold as pork, produced a return of eighty-nine cents a bushel.

The prices for grain are those actually paid for the grain used, delivered at the Station. The initial value of the hogs is the average Calgary price for "lights and feeders" for the month of November, 1928, less seventy-five cents per hundred pounds, the usual drover's deduction for handling. The selling price is the price actually received when the hogs were sold.

SUMMARY OF WORK WITH PROTEIN SUPPLEMENTS

In 1925 experimental work with swine was started with the object of determining the merits of various protein supplements to the grain ration of market hogs in their effect on economy and rapidity of gains as well as on the type of the hog as judged by market standards. For the purpose of comparison, the number of hogs on trial, the average number of days and the pounds of grain required to produce one pound of gain, are reported. The grain ration in all cases, with one exception when some shorts were fed, consisted of oats and barley, oats predominating in the mixture in the early stages of the trial, and the proportion of barley being gradually increased as the pigs grew older.

All trials stated as on pasture were naturally conducted in the summer time while all trials on dry lot were conducted during the winter months, with the exception of one dry lot trial with skimmed milk and tankage, and one with skimmed milk and fish meal, which were conducted during the summer of 1928 on dry lot.

Where skimmed milk was fed, it was at the rate of from five to ten pounds daily; alfalfa meal was fed in a self feeder; tankage and fish meal were fed at the rate of from eight to ten per cent of the grain ration. In all cases, grain was hand fed according to the amount that the pigs would clean up.

Tankage to Hogs on Pasture

Total of thirty-one hogs. Average results of three trials—

Average number of days on trial		142
Average daily gain	pounds	1·15
Average gain required to produce 1 pound gain	pounds	5·63

Tankage to Hogs on Dry Lot

Total of twenty-eight hogs. Average results of four trials—

Average number of days on trial		132
Average daily gain	pounds	1·12
Average grain required to produce 1 pound gain	pounds	5·41

Skimmed Milk Fed to Hogs on Pasture

Total of thirty-two hogs. Average result of three trials—

Average number of days on trial		147
Average daily gain	pounds	1·06
Average grain required to produce 1 pound gain	pounds	4·81

Skimmed Milk Fed to Hogs on Dry Lot

Total of eighteen hogs. Average results of three trials—

Average number of days on trial		125
Average daily gain	pounds	1·20
Average grain required to produce 1 pound gain	pounds	5·22

Fish Meal Fed to Hogs on Pasture

Total of ten hogs. Result of one trial—

Average number of days on trial		141
Average daily gain	pounds	0·95
Average grain required to produce 1 pound gain	pounds	5·09

Fish Meal to Hogs on Dry Lot

Total of six hogs. Result of one trial—		
Average number of days on trial		139
Average daily gain	pounds	1·12
Average grain required to produce 1 pound gain	pounds	5·31

Alfalfa Meal to Hogs on Dry Lot

Total of eighteen hogs. Average result of two trials.—		
Average number of days on trial		135
Average daily gain	pounds	1·03
Average grain required to produce 1 pound gain	pounds	6·45

Straight Grain on Pasture

Total of thirty-two hogs. Average result of three trials—		
Average number of days on trial		150
Average daily gain	pounds	0·95
Average grain required to produce 1 pound gain	pounds	5·28

Straight Grain on Dry Lot

Total of twenty-four hogs. Average result of three trials—		
Average number of days on trial		137
Average daily gain	pounds	1·0
Average grain required to produce 1 pound gain	pounds	6·31

EXPERIMENTS WITH MIXED SUPPLEMENTS

Skimmed Milk and Tankage, Dry Lot

Total of sixteen hogs. Average result of two trials—		
Average number of days on trial		148
Average daily gain	pounds	0·98
Average grain required to produce 1 pound gain	pounds	4·97

Skimmed Milk and Fish Meal Dry Lot

Total of sixteen hogs. Average results of two trials—		
Average number of days on trial		135
Average daily gain	pounds..	1·21
Average grain required to produce 1 pound gain	pounds..	4·12

The above results of the various protein feeds on the rate and economy of gain in pigs indicate that maximum gains are produced when a protein feed of animal origin is fed in conjunction with the grain ration, and also that the more varied the supply of these protein feeds the more efficient they are in promoting gains on low grain requirements.

The economy of these feeds measured in money values can be best worked out by the individual wishing to use this information, current values for the various feeds being used in calculating the value of savings in grain by the use of protein supplements. Greater rapidity of gain and the influence on type is also a consideration.

The following data include the results of three years' work when slaughtering tests were carried on with all experimental hogs. The results as given below would indicate that the protein supplements to the grain ration have a pronounced bearing on the type of the market hog.

These results are all comparable in that they represent the average of three trials conducted in three different years. The groups being compared are comprised of animals allotted from the same litter in order to overcome variation due to inherent qualities.

Grading reports where available will be presented on hogs raised on various feeds showing average percentage of the total hogs fed on each feed which graded select or thick smooth and shop, and giving average length of side.

Hogs Fed Straight Grain, Dry Lot

Number of hogs	22
Per cent selects	14·5
Per cent thick smooths and shops	85·5
Average length of side.....inches	28·8

Hogs Fed Straight Grain on Pasture

Number of hogs	32
Per cent selects	25
Per cent thick smooths and shops	75
Average length of side.....inches	29·4

Hogs Fed Skimmed Milk on Pasture

Number of hogs	32
Per cent selects	46·1
Per cent thick smooths and shops	53·9
Average length of side.....inches	30·4

Hogs Fed Tankage on Pasture

Number of hogs	31
Per cent selects	45·6
Per cent thick smooths and shops	54·4
Average length of side.....inches	29·3

CROSS-BREEDING—TAMWORTH X YORKSHIRE HOGS VS. PURE-BRED YORKSHIRE

In 1926 the station secured the registered Tamworth boar "Amber Freshman" with the object of gaining some information on the effect of cross-breeding on economy of production and on type of market hogs.

The sows used were all matured registered Yorkshires of the same strain of breeding. The data presented in the following table are the average of results obtained in comparative feeding trials in 1927 and 1928.

It is noticeable that in all cases the cross-bred pigs produce gains more rapidly and more economically, but nevertheless do not conform so well to the desired type of bacon hog as do the pure-bred pigs.

CROSS-BRED VS. PURE-BRED HOGS

Items	Tamworth Yorkshire cross	Pure-bred Yorkshires
Breed of dam	Yorkshire	Yorkshire
Breed of sire	Tamworth	Yorkshire
Number of pigs	19	20
Average number of days in trial	135·9	140·5
Total initial weight.....lb.	871·0	695·0
Average initial weight.....lb.	45·8	34·7
Total final weight.....lb.	3,973·0	3,601·0
Average final weight.....lb.	209·1	180·0
Total gain.....lb.	3,102·0	2,906·0
Average gain.....lb.	163·3	145·3
Average daily gain.....lb.	1·20	1·03
Total grain consumed.....lb.	13,912·4	14,665·4
Grain required per pound of gain.....lb.	4·48	5·05
Average number of days from birth to marketing	216·8	217·4
Thirteen hogs from each group were graded officially as follows:—		
Selects	1	9
Thick smooths	12	4

COMPARISON OF SUMMER AND WINTER FEEDING OF SWINE

The rate of gain per day and the amounts of oats and barley meal required to produce one pound of gain have been worked out for groups of comparable hogs on summer and winter trials in so far as the feeding conditions and feeds

were concerned. The following figures indicate that gains have been slightly more rapid and grain requirements slightly higher in the case of winter feeding. The hogs fed during the summer were on alfalfa pasture and had hog cabins for shelter. The winter-fed hogs were in straw shelters or hog cabins banked with straw. The fact that summer hogs on pasture do not make a better showing than winter hogs is possibly explained in that well-constructed straw sheds or colony houses can be particularly comfortable and dry in ordinary winter weather in southern Alberta, and during the summer there is often a drawback to maximum gains due to excessive heat, muddy yards, sun scald and flies.

—	Summer feeding	Winter feeding
Number of hogs considered	105	76
	lb.	lb.
Average daily gain	1·03	1·11
Grain required to produce one pound of gain	5·08	5·56

CEREALS*

The 1928 crop will be remembered chiefly on account of its high yield, uneven growth, and frost damage in certain localities. From the fall rains of the previous season an unusually large amount of moisture was stored in the soil. Part of this, however, was lost in the spring. The precipitation of June and July was well above the average received in the district for these two months, and all crops grew vigorously from the first of June until harvesting without ever suffering from the lack of moisture. This factor was mostly responsible for the high yields.

There was practically no precipitation from the commencement of seeding until the first of June, and the high winds that prevailed at the time of seeding soon dried out the surface soil. Crops that were seeded early on summer-fallowed land commenced growth before the soil got dry enough to interfere with the germination. Where late seeding was done, especially on land that was growing a grain crop for the second season, a considerable percentage of the seed failed to reach moisture, and consequently did not germinate until the June rains occurred. This resulted in a very uneven growth which was quite apparent throughout the season, and the uneven ripening in many cases produced grain with a sufficient percentage of green kernels to cause a material reduction in grade.

A frost about the middle of August and another about the end were sufficiently severe in certain localities to check the development of grain crops, with the result that a considerable proportion of the wheat crop graded No. 5, No. 6 or feed.

Weather conditions during the fall months were particularly favourable for harvesting and threshing. A few rains occurred during the latter part of August, but there was practically no rain throughout September, October, and the first half of November. Farmers, therefore, had a splendid opportunity to get their crops threshed without damage. Combines also had much better conditions under which to operate than what have prevailed during past seasons, and a good proportion of the crop was harvested by these machines with good satisfaction.

* The work with cereals and forage crops is under the supervision of W. D. Hay, B.S.A., whose material assistance in the preparation of the report under these headings is gratefully acknowledged.

DRY LAND

VARIETY TESTS

Fifty varieties of wheat, twenty-five of oats, and twenty-five of barley were tested in rod-row plots. This system of testing has been practised for the last five years and a brief explanation of it, along with results obtained, appears later in the report. As well as the standard or more commonly grown varieties, there were included in these numbers several recent introductions. Tests of the more important varieties were also conducted in one-fortieth-acre plots, and the results of these follow:—

WHEAT

There were thirteen varieties of wheat grown for comparative purposes in duplicate plots one-fortieth acre in size. All varieties were seeded on May 9 and the rate in all cases was 75 pounds per acre. On account of the uneven germination and early growth the grain from some of the varieties showed a considerable percentage of immature kernels.

WHEAT—TEST OF VARIETIES (DRY LAND)

Grown in duplicate plots 1/60 acre each

Variety	Date of ripening	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre	Weight per measured bushel	Average Yield per acre for past four years
			inches		bush.	lb.	bush.
Red Bobs 222	Aug. 24	107	46	10·0	43·9	64·0	36·7
Supreme	Aug. 29	112	46	10·0	45·8	61·8	34·0
Renfrew	Sept. 3	117	53	9·5	40·3	62·3	33·4
Red Fife Ott. 17	Sept. 7	121	48	10·0	36·1	61·5	32·0
Early Triumph	Aug. 24	107	44	10·0	43·7	63·3	30·7
Marquis 10B	Aug. 30	113	45	10·0	45·4	63·8	30·3
Kitchener	Sept. 4	118	50	10·0	40·1	62·5	29·6
Reward Ott. 928	Aug. 18	101	42	9·5	35·5	65·5	26·1
Garnet Ott. 652	Aug. 12	95	42	9·5	37·9	63·5	24·6
Marquis Ott. 15	Aug. 30	113	44	9·5	42·5	64·3	
Hard Federation 31	Aug. 26	109	38	10·0	41·2	63·8	
Early Red Fife Ott. 16	Sept. 5	119	46	9·5	40·1	62·8	
Hard Federation 71	Sept. 1	115	39	10·0	33·3	63·0	

The first two varieties in the table are selections from the original Red Bobs, the former being made by the University of Alberta, and the latter by Dr. Seager Wheeler. They are the two leading varieties when results are averaged for the past four years, but have been criticized by some farmers on account of the grain having a tendency to bleach when exposed to adverse weather conditions. Renfrew is a variety very similar to Marquis in appearance. The chief difference between it and Marquis is that it is about seven inches longer in the straw and about four days later in maturing. It has outyielded Marquis slightly, and where it is important to have straw of good length the Renfrew should be found a suitable variety. Red Fife Ott. 17 is a few days later than Renfrew but resembles it closely in other respects. Early Triumph is almost identical in all respects with Red Bobs 222. It is also a selection from Red Bobs made by Dr. Seager Wheeler. The outstanding difference between Kitchener and Marquis is that Kitchener is about five days later. It has less to commend it than Renfrew where a later and taller growing variety than Marquis is chosen. As regards time of ripening and yield, Reward has been found intermediate between Marquis and Garnet. It has much less tendency to shatter than Garnet and has excellent milling and baking qualities. Where farmers require a variety earlier than Marquis and are not quite satisfied with

Garnet and the Red Bobs selections, Reward should be a good variety to choose. It has been found to maintain its attractive appearance exceptionally well Where the shortness of the growing season is a limiting factor in wheat growing, Garnet is recommended.

The two Federation strains were tested in one-sixtieth acre plots this season for the first time. They did not compare favourably with the other varieties, and as they are white wheats there seems to be no reason for recommending them anywhere in the district. They were included in the variety tests merely because the Federation variety has been introduced in the district in recent years. The Early Red Fife is another late variety. It would probably be found to give good satisfaction in the district if it were not for its decided tendency to shatter.

OATS

Twelve varieties of oats were grown in comparative test plots. Seeding of all varieties was done on May 9, at this rate of seventy-five pounds per acre. The dryness of the soil resulted in an uneven germination, and while the yields obtained were considerably higher than usual the quality of grain was somewhat reduced.

OATS—TEST OF VARIETIES (DRY LAND)

Grown in duplicate plots 1/60 acre each

Variety	Date of ripening	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre	Weight per measured bushel	Average yield per acre for past seven years
			inches		bush.	lb.	bush.
Victory	Aug. 26	108	52	9·5	115·5	36·8	70·3
Leader	Aug. 30	112	48·5	9·0	99·6	33·8	67·2
Banner Ott. 49	Aug. 20	102	49	10·0	104·2	38·0	66·3
Danish Island	Aug. 20	102	52·5	10·0	93·4	38·8	63·6
Gold Rain	Aug. 23	105	55	10·0	102·4	41·0	60·2
Longfellow Ott. 478	Aug. 20	102	50	8·0	106·7	34·5	57·8
Scottish	Sept. 1	114	50	9·5	109·8	40·0	
Markton	Aug. 23	105	53	9·5	105·9	35·5	
Gerlach	Aug. 24	106	49	10·0	94·7	38·0	
O.A.C. 3	Aug. 14	96	44	9·5	74·9	35·8	
Laurel Ott. 477	Aug. 16	98	42	10·0	63·3	50·5	
Alaska	Aug. 8	90	49	9·5	62·3	36·3	

Under dry land conditions Victory has been the highest yielding variety for the past seven year period. It has generally outyielded other varieties in dry seasons. Leader, a variety of the side panicle type, has also been a consistently high yielder. Banner is probably the most commonly grown variety in the district and is generally recommended where moisture is plentiful and good strength of straw is an important requirement. Scottish and Markton are two varieties which have been under test for only one year, but both are promising. The former was imported from Scotland and the latter from Montana. Laurel is a hulless variety, and is the one which has given most satisfaction of varieties of that class.

BARLEY

Sixteen varieties of barley were seeded in duplicate on May 9. The rate of seeding was seventy-two pounds per acre in each case. The unevenness in germination and growth throughout the season was apparent, but not to the same extent as in the wheat and oats varieties.

BARLEY—TEST OF VARIETIES (DRY LAND)

Grown in duplicate plots 1/60 acre each

Variety	Date of ripening	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre	Weight per measured bushel	Average yield per acre for past five years
			inches		bush.	lb.	bush.
Trebi	Aug. 15	98	41	9·0	87·9	50·3	62·6
Cape	Aug. 12	95	39	8·0	67·5	41·3	53·4
Bark's	Aug. 31	114	40	10·0	78·3	47·5	52·8
Swedish Chevalier	Aug. 22	105	46	7·0	71·9	55·5	50·8
Gold	Aug. 20	103	38	9·0	72·7	54·3	48·5
Mariout	Aug. 18	101	33	9·0	53·6	44·5	45·8
Junior Ott. 47	Aug. 6	89	31	9·0	52·9	62·8	45·4
Bearer Ott. 475	Aug. 20	103	50	7·0	70·2	47·0	45·0
Chinese Ott. 60	Aug. 15	98	51	7·5	60·0	53·0	42·3
O.A.C. 21	Aug. 15	98	52	7·5	58·2	50·3	41·9
Himalayan Ott. 59	Aug. 6	89	34	6·5	61·1	62·5	41·8
Early Chevalier Ott 51	Aug. 9	92	46	7·5	49·4	54·0	39·3
Duckbill Ott. 57	Aug. 20	103	49	9·5	51·7	52·8	39·1
Horn	Aug. 20	103	44	6·0	69·4	55·8	
Hannchen	Aug. 17	100	43	8·0	66·3	55·0	
Canadian Thorpe	Aug. 20	103	50	9·5	52·5	52·3	

Trebi has proved the highest yielding barley variety at the Station on both dry and irrigated land. Its yield over the five year period is considerably higher than that of other varieties tested. Bark's stands third in yield for the five year period. It has proved a high yielder under irrigated conditions and the past two seasons when precipitation has been more plentiful than usual have helped greatly to increase its average yield. Swedish Chevalier has been the best yielder of the two-row type. Mariout is also a variety that responds better under irrigated conditions. Junior and Himalayan are hulless varieties, the former being much stronger in the straw and producing grain of more attractive appearance than the latter. O.A.C. 21 has been outyielded by several other varieties during recent years, but is the one which is most preferred for malting purposes. Horn is a new variety of the two-row type imported from Montana where it has given particularly good results. It has compared favourably with other varieties this season.

ROD-ROW METHOD OF TESTING CEREAL VARIETIES

The rod-row method of testing has been used at the Station for the last five years and the average yields for this period of varieties tested by this method on dry land are given in the table following. Each variety was seeded four times, in plots consisting of five rows seven inches apart and 18·5 feet long. Only the ordinary row space of seven inches was left between plots. At harvest time one foot was cut off each end of the plots making them exactly a rod in length. By discarding these plants, which had grown under abnormal conditions, and also the outside rows of each plot, three rows were left which had grown under normal field conditions. The yields were obtained, therefore, by harvesting the three centre rows of each plot and averaging them.

AVERAGE YIELDS FOR PAST FIVE YEARS OF VARIETIES OF WHEAT, OATS AND BARLEY TESTED IN ROD-ROW PLOTS (DRY LAND)

Wheat	Bushel per acre	Oats	Bushel per acre	Barley	Bushel per acre
Early Triumph	29·0	Leader	55·1	Hannchen	41·9
Supreme	27·7	Columbian Ottawa 78	51·4	Swedish Chevalier	35·9
Kota	27·6	Irish Victor P	50·5	Himalayan, Ottawa 59	35·8
Marquis Sask 7	27·1	Danish Island	50·4	Charlottetown No. 80	35·3
Kitchener	26·3	Leader B	48·7	Chinese, Ottawa 60	35·3
Marquis, Ottawa 15	26·0	Gerlach	48·6	Earley Chevalier, Ott.51	33·0
Marquis, McD. 114	25·6	Gold Rain	48·4	O. A. C. No. 21	32·9
Huron, Ottawa 3	25·5	Legacy, Ottawa 678	44·6	Bearer, Ottawa 475	32·7
Marquis 10B	25·1	Alaska	36·8	Junior, Ottawa 471	31·3
Marquis, McKay	24·5	Leader A	35·4	Duckbill, Ottawa 57	27·1
Acme	24·2	Laurel, Ottawa 477	23·4		
Ruby, Ottawa 623	23·7				
Golden	23·7				
Crown, Ottawa 353	22·2				
Duchess, Ottawa 933	22·0				
Garnet, Ottawa 652	21·2				
Reward, Ottawa 928	21·0				
Kubanka	20·3				
Master, Ottawa 520	18·8				
Prelude, Ottawa 135	18·1				

In comparing this table with the one showing the results of the wheat varieties in one-fortieth acre plots it will be seen that the Red Bobs selections have been the highest yielding varieties in both cases. The Marquis strains stand somewhat higher in the rod-row tests than in the one-fortieth acre tests, but the low yielding varieties in the preliminary system of testing are also found to be low yielding ones in the larger plots.

Of the oats varieties tested for five consecutive years in rod-row plots, Leader is probably the most commonly grown one, and has given the highest yield. Unfortunately plots of Banner and Victory, two varieties which would probably have outyielded Leader, were damaged one year, making it impossible to include these varieties in the average for the full period.

Trebi would most probably have been found the highest yielding variety of barley if it had been under test for the full five year period, in view of the fact that it outyielded other varieties to such an extent in the larger plots. The leading variety, Hannchen, is one of the two-row type.

FIELD BEANS

Variety tests have been conducted with field beans for the past four seasons on dry and irrigated land. In the first three seasons seeding was done with a corn planter, spacing the rows three feet apart, and seeding at the rate of approximately fifty-five pounds per acre. It was considered that higher yields and a greater degree of maturity might be obtained by spacing the rows closer together, so the 1928 tests were seeded with a beet drill in rows twenty-two inches apart. All varieties were well matured when harvesting was done in the middle of September, but the yields were lower than usual. This was due largely to the surface soil having drifted badly in previous seasons. Tests were carried out in quadruplicate and seeding was done on May 21.

The narrow spacing of the rows has been practised for only one season so it would scarcely be fitting to recommend this method before making further trials, but the results obtained seem to indicate that the beet drill will be found a satisfactory implement for the planting of this crop.

BEANS—TEST OF VARIETIES (DRY LAND)

Grown in quadruplicate plots 1/400 acre each

Variety	Number of days maturing	Colour of beans	Size of beans	Yield per acre	Average yield per acre 1925-26-28
				bush.	bush.
Luther Burbank	113	White	Small	3·19	13·28
Michigan Early Wonder	118	White	Small	3·3	11·45
Australian Brown	110	Brown	Large	5·25	10·50
Robust	119	White	Small	3·49	10·20
Imperial Pea Bean	114	White	Large	3·72	9·60
Meyer	114	White	Small	4·16	8·75
Great Northern	120	White	Medium	4·69	8·31
Yellow Six Weeks	107	Yellow	Large	3·38	8·11
Navy, Ottawa 711	114	White	Large	4·93	7·92
Beauty, Ottawa 712	108	White & Brown	Medium	3·38	7·27
Kotenashi	120	White	Small	3·35	6·69
Large White, Ottawa 713	114	White	Large	3·76	6·59
Lady Washington	119	White	Medium	3·38	6·55

Luther Burbank, although it was outyielded by other varieties this season, has proved the highest yielder when the results are averaged for the three seasons, and appears so far to be the variety most worthy of recommendation. The market demands are for beans of the small white type, and this variety is desirable from that standpoint. Earliness is also an essential in bean varieties and Luther Burbank has been found the earliest of those of the small white type. Michigan Early Wonder and Robust are probably the next best. Great Northern is the variety which has been giving most satisfaction in many districts of the northern States where beans are an important crop, chiefly on account of its baking qualities, but so far it has been found rather late in maturing in the Lethbridge district. Kotenashi is the variety which is imported from Japan to supply the market demands, but lateness in maturing also makes it one of the less desirable varieties for the district.

IRRIGATED LAND

VARIETY TESTS

For the past two seasons variety testing of cereals on irrigated land has been conducted only in rod-row plots. This method of testing has been outlined in the portion of the report dealing with cereal tests under dry land conditions. For the preceding three seasons the more important varieties were compared in duplicate one-sixtieth acre plots as well as rod-row plots. Several varieties have been under test in these small plots for the past five seasons and their average results for this period are shown in the tables which follow. They have been grown in a rotation having roots as the preceding crop. The rates of seeding were: wheat 1½ bushels per acre, oats 2½ bushels per acre, barley 2 bushels per acre. One irrigation has been found sufficient each season and this has usually been given just before the earliest maturing barleys began to head out.

This season, on account of the uneven germination and the continued drought throughout the month of May, it was deemed expedient to irrigate the land on June 1, in order to germinate the seed. The rains commenced just after irrigating was completed and continued until many of the plots appeared to be suffering from excess of moisture. The warm weather of July and August produced a rapid, heavy growth and resulted in high yields. The weather during harvesting was more favourable than that of preceding seasons so that the quality of the grain produced by the different varieties was of a higher standard.

WHEAT—TEST OF VARIETIES (IRRIGATED LAND)

Average results for past five years from quadruplicate rod-row plots

Variety	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre
		in.		bush.
Early Triumph	119	45	9	63·7
Supreme	122	42	8	61·3
Huron (Ottawa 3)	126	50	8	60·8
Marquis (Ottawa 15)	125	46	8	60·1
Marquis, Sask. 7	125	48	8	59·9
Marquis, McD. 114	125	47	8	59·3
Marquis, McKay	126	46	8	59·1
Kubanka	134	55	6	58·6
Marquis, 10B	125	47	8	58·5
Kitchener	129	51	8	57·2
Kota	126	52	5	54·9
Golden	125	46	7	54·7
Reward (Ottawa 928)	116	43	9	53·6
Early Red Fife	128	49	8	53·0
Acme	131	53	5	49·6
Garnet (Ottawa 652)	113	41	9	47·9
Ruby (Ottawa 623)	112	42	9	43·4
Crown (Ottawa 353)	115	42	9	43·4
Duchess (Ottawa 933)	115	42	9	42·5
Master (Ottawa 520)	113	40	9	40·9
Prelude (Ottawa 135)	110	40	9	32·4

Early Triumph and Supreme, two selections from Red Bobs, have been found the highest yielding varieties in the tests conducted on irrigated land. They have not outyielded the Marquis strains, however, to such an extent that they can be safely recommended in preference to Marquis throughout the district. They have a slightly greater tendency to shatter than has Marquis, and have been found by farmers in certain localities to bleach or deteriorate in appearance when exposed to adverse weather conditions. The Early Triumph selection has ripened in five days less than Marquis, and where earliness is an important factor on irrigated land it could probably be chosen to advantage. Reward and Garnet are practically the only other varieties listed that are receiving much consideration in this district and their relationship to Marquis in yield, time of ripening, etc., is about the same as under dry land conditions.

OATS—TEST OF VARIETIES (IRRIGATED LAND)

Average results for past five years from quadruplicate rod-row plots

Variety	Number of days maturing	Strength of straw on scale of 10 points	Length of straw	Yield per acre
			in.	bush.
Leader B	115	6·4	53	110·3
Leader	116	6·4	53	109·8
Columbian (Ottawa 78)	115	6·4	54	107·6
Danish Island	115	6·1	53	101·9
Legacy (Ottawa 678)	111	7·0	47	101·7
Gerlach	115	5·7	53	100·1
Victory	115	6·4	53	99·5
Prolific (Ottawa 77)	117	6·0	54	96·7
Gold Rain	113	6·3	57	96·1
Irish Victor P	113	6·4	55	95·3
Leader A	107	7·8	50	85·6
Alaska	105	8·4	46	81·6

Banner has been found the most desirable variety of oats under irrigated conditions, being the highest yielder and having more strength of straw than most other varieties, but unfortunately the plots where it was grown became damaged

one season and its results could not, therefore, be included in the table for the five year period. Two strains of Leader, a side panicle variety, have yielded highest of the varieties under test for the entire period. Victory has been the highest yielder under dry land conditions but has been outyielded by several others on irrigated land. Alaska is the earliest variety tested, but also the lowest yielding.

BARLEY—TEST OF VARIETIES (IRRIGATED LAND)

Average results for past five years from quadruplicate rod-row plots

Variety	Number of days maturing	Strength of straw on scale of 10 points	Length of straw	Yield per acre
			in.	bush.
O. A. C. 21	103	7·1	46	73·6
Chinese (Ottawa 60)	103	7·0	45	72·1
Hannchen	110	6·1	41	71·4
Bearer (Ottawa 475)	111	6·2	46	69·1
Charlottetown (No. 80)	110	7·5	41	68·3
Himalayan (Ottawa 59)	104	6·9	35	64·4
Swedish Chevalier	114	5·3	41	62·0
Junior (Ottawa 471)	101	7·3	35	58·7
Duckbill (Ottawa 57)	109	8·8	43	55·7
Early Chevalier (Ottawa 51)	101	7·4	45	53·6

The two best varieties of barley for irrigated land, Trebi and Bark's, have not been included in the rod-row variety tests for the full five year period. The former has been found the highest yielding of all varieties tested and it also ripens in about the same time as O.A.C. 21. The latter is a heavy yielding sort but is very late in maturing. O.A.C. 21, which is the most commonly grown variety in the district at the present time, has outyielded other varieties with which it has been compared in these tests. It is the variety recommended where barley is grown for malting purposes. Hannchen is a variety of the two-row type and the best yielder of this class. Himalayan and Junior are varieties of the hulless type. Duckbill is one of the lowest yielding varieties, but probably one of the best to use where barley is seeded late and used as hay or green feed.

PEAS

For the past five seasons variety tests of peas on irrigated land have been conducted in rod-row plots in quadruplicate. Previous to that duplicate one-fortieth acre plots were used. Seeding has been done at the rate of three bushels per acre and the land used has been in hoed crops the previous seasons.

PEAS—TEST OF VARIETIES (IRRIGATED LAND)

Grown in quadruplicate rod-row plots of five rows each

Variety	Number of days maturing	Length of straw	Length of pod	Weight per measured bushel	Yield per acre, 1928	Yield per acre 1918–1928 (inclusive)
		in.	in.	lb.	bush.	
Prussian Blue	141	73·0	2·13	63·0	56·96	42·5
Mackay (Ottawa 25)	142	79·0	2·06	63·0	48·61	41·7
Chancellor (Ottawa 26)	142	64·8	1·53	64·5	49·7	41·0
Arthur (Ottawa 18)	138	68·0	2·13	64·0	44·9	35·5
English Grey	147	85·8	2·19	61·5	47·1	34·4
Solo	142	74·0	2·19	61·0	43·8	32·3
Golden Vine	146	90·5	1·78	64·0	26·7	30·1
O. A. C. 181	136	72·0	2·0	63·5	55·4	.....
Cartier (Ottawa 19)	144	72·8	1·9	62·5	36·6	.....

Prussian Blue has been a consistently high yielder and is leading both for the year and in the average for the period. Mackay is of a much more desirable colour and since its yield is so little lower than that of Prussian Blue it is generally recommended in preference to it. Arthur is also one of the more desirable varieties both from the standpoint of appearances and yield. O.A.C. 181 has been under test for only two seasons but appears so far to be a promising variety.

FORAGE CROPS

As a result of the dry spring weather much difficulty was experienced in getting satisfactory stands with many of the different classes of forage crops seeded. The surface soil dried out fast to a depth beyond which it was safe to seed clover and grass seed, and any seed of this class that was seeded in dry soil did not get an opportunity to germinate until the first week of June. At that time the weed growth in many cases was so heavy that it was difficult for clover and grass crops to become established. With the plentiful supply of moisture furnished by the June rains the yields from hay and pasture crops were heavier than usual.

The root crops at the Station were irrigated during the latter part of May to germinate the seed and the rains which followed kept the soil in such a wet condition that little or no growth occurred until early in July. Under such conditions the weeds on many of the best fields of the district got so well started that it was found difficult to get the fields cleaned and thinned at the proper time. Some losses were experienced from cutworms but not sufficient to cause any serious losses.

In corn also the growth in the early part of the season was extremely slow, so that practically none of the varieties tested were fully matured at the middle of September, which is the usual time for harvesting. The continuous mild weather throughout September provided favourable conditions for the maturing of corn that had not been harvested at the ordinary time, thus prolonging the growing season.

TESTS CONDUCTED ON DRY LAND

CORN

Thirty-five varieties or strains of corn were seeded for ensilage purposes on May 12. Seeding was done with an ordinary two row corn planter in rows three feet apart. The plants were thinned to a distance of ten inches apart in the row. Testing was done in quadruplicate $\frac{1}{100}$ acre plots and two pound samples were taken from each variety at harvesting for dry matter determination.

CORN—TEST OF VARIETIES (DRY LAND)

Variety	Source	Height of plant at harvest	Maturity at harvest	Yield per acre green weight	Yield per acre dry matter	Per cent dry matter	Average yield dry matter for period four years
		ft. in.		tons lb.	tons lb.		tons lb.
Northwestern Dent	Disco	4 8	Early milk	4 ...	1,630	20·63	1 1,558
Northwestern Dent	Ex. Farm, Brandon	3 8	Dent	1 1,800	1,243	31·81	1 1,461
Dakota White Flint	O. Will	3 7	Dough	2 1,625	1,653	27·53	1 1,362
Compton's Early	J. O. Duke	5	Ears formed	4 1,000	1,648	18·34	1 963
Longfellow	J. O. Duke	5 2	Ears formed	4 1,200	1,630	17·82	1 408
Northwestern Dent (Crookston Strain)	Northrup King	4 3	Dent	3 200	1 1,264	36·11	
Mandan Zuni	O. Will	4 1	Milk	4 900	1 267	25·59	
Falconer	O. Will	4 1	Dent	3 100	1,819	27·83	
Burr Leaming	Carter	5 6	Ears formed	4 1,600	1,746	18·06	
Northwestern Dent	Lethbridge Ex. Stn. Strain	4	Dent	2 900	1,706	34·26	
Mercer	Northrup King	4 9	Milk	3 1,400	1,685	22·63	
Leaming	J. O. Duke	5	Ears formed	4 100	1,668	20·83	
Pride Yellow Dent	Disco	4 4	Ears formed	3 700	1,658	25·39	
Northwestern Dent	O. Will	4 2	Early dent	2 1,000	1,558	31·25	
Square Delal	O. Will	3 11	Dent	2 200	1,538	37·23	
Minn. No. (Haney St.)	Northrup King	4 3	Early dent	2 1,400	1,479	26·91	
Gehu	Disco	3 7	Glazed	2 1,600	1,475	26·99	
Wisconsin No. 7	J. O. Duke	4 11	Ears formed	3 1,100	1,474	19·09	
White Cap Yellow Dent	J. O. Duke	4 10	Late silking	3 1,200	1,446	19·69	
Golden Glow	J. O. Duke	5	Ears formed	3 900	1,402	20·31	
Minn. No. 13 Double Cross	Northrup King	4 2	Dent	2	1,395	33·91	
Silver King	A. C. Popp	4 7	Silking	3 500	1,394	21·87	
Bailey	J. O. Duke	4 7	Ears formed	3 700	1,392	20·90	
Brown County Dent	Northland Seed Co.	3 10	Milk	2 400	1,369	30·89	
White Flint (Stewart Strain)	Northland Seed Co.	3 5	Dough	2 1,600	1,336	24·20	
Minn. 13 Howe's	Northrup King	4 1	Dough	2 500	1,282	28·40	
Northwestern Dent	C.P.R. Brooks	3 8	Dent	1 1,700	1,238	31·89	
Silver King	Disco	4 9	Ears formed	3 100	1,228	20·13	
Mandan King	O. Will	3 10	Milk	2 1,900	1,208	19·92	
Quebec 28	Macdonald Coll.	3 9	Glazing	2	1,154	28·71	
Assiniboine Yellow	O. Will	3 4	Milk	2 200	1,031	25·34	
Manitoba Flint	Man. Agr. Coll.	3 6	Glazing	1 1,700	1,028	28·52	
Twitchell's Pride	Ex. Station Fredericton	3 7	Dough	2	1,011	27·49	
Pioneer	O. Will	4	Ears formed	1 100	945	30·59	
Minnesota 23	Northland Seed Co.	3 10	Dough	1 700	933	34·28	

Northwestern Dent is the variety most commonly grown for ensilage purposes, and of the five varieties that have been tested over a four year period two strains of this variety have given the highest yield of dry matter. The Haney strain of Minnesota No. 13 can also be recommended as a good ensilage variety for the district, being very similar to Northwestern Dent both from the standpoint of maturity and yield. The taller growing and later maturing varieties had, in most cases, only commenced to form ears at the time of harvesting. Dakota White Flint and Gehu are two of the best varieties tested for districts where early varieties can generally be expected to reach a fair degree of maturity. In districts where the season is almost too short for corn, such varieties as Manitoba Flint, and Howe's Alta Flint, which was not included in the test this year, are the safest varieties to use.

MANGELS

Five varieties of mangels were grown in quadruplicate $\frac{1}{100}$ acre plots. Seeding was done with an ordinary two-row corn planter in rows three feet apart, and the plants were thinned in the row to a distance of ten inches apart. Yields were determined by harvesting the four plots of each variety and averaging the results.

Although the seed was planted early in May, it did not germinate until the first week in June.

MANGELS—TEST OF VARIETIES (DRY LAND)

Variety	Source	Yield per acre green weight		Yield per acre dry matter	Percentage dry matter	Average yield per acre (green weight) for 3 years
		tons	lb.	lb.		tons
Mammoth Long Red	McFayden	5	350	1,375	13·55	21·4
Golden Tankard	Rennie	4	700	844	9·69	20·0
Red Half Sugar	McFayden	7	1,600	1,872	11·99	13·2
Yellow Intermediate	McKenzie	10	567	.....	.....	.....11.2
Giant Yellow	Steele Briggs	8	1,600	1,915	10·94	.....

SUGAR BEETS

There were nine varieties of sugar beets under test. These were seeded early in May, but as in the case of mangels, they did not germinate until the first week in June. Seeding was done with an ordinary beet drill in rows twenty-two inches apart and the plants were thinned in the row to ten inches apart. The table following shows the per cent of sugar in the juice of the different varieties and the coefficient of purity, as determined by an analysis of representative roots of each variety made by the Division of Chemistry.

SUGAR BEETS—TEST OF VARIETIES (DRY LAND)

Variety	Source	Yield per acre		Sugar in juice	Coefficient of purity
		tons	lb.	per cent	per cent
Ramon	Chemistry Division C.E.F., Ottawa	7	1,080	16·87	83·37
9N	Amtorg Trading Co., N.Y.	7	950	17·07	82·73
7E	Amtorg Trading Co., N.Y.	7	580	16·97	82·28
Kalnik	Chemistry Division, Ottawa	6	1,020	17·78	82·96
Commercial	Canadian Sugar Factories, Raymond	6	100	17·03	81·89
Niemertche	Chemistry Division, Ottawa	5	1,700	17·65	83·14
Buszczynski	" "	5	1,280	17·71	84·76
Fredericksen	" "	5	600	16·75	81·72
Dippe	" "	5	500	16·85	82·19

SWEDE TURNIPS

Comparative tests were conducted with seven varieties of swede turnips. The seeding of these was done with a corn planter, spacing the rows three feet apart. Quadruplicate $\frac{1}{100}$ acre plots were used and the yields were determined by averaging the results of the four plots of each variety. The plants were thinned to ten inches apart in the row. As in the case of varieties of other classes of roots the per cent of dry matter was determined by drying five pound samples of each variety in an oven until they ceased to lose moisture, and computing what proportion the dried residue was of the original weight.

SWEDES—TEST OF VARIETIES (DRY LAND)

Variety	Source	Yield per acre green weight		Yield per acre dry matter		Percentage dry matter	Average yield (green weight) per acre 3 years	
		tons	lb.	tons	lb.		tons	lb.
Ditmars	McNutt	18	200	1	1,440	9·57	16	1,600
Canadian Gem	Rennie	15	900	1	1,125	10·18	15	800
Magnum Bonum	Rennie	11	1,800	1		9·82	14	1,000
Bangholm	McKenzie	15	1,300	1	1,260	10·33	14	600
Purple Top	Rennie	11	1,100	1	290	9·96	12	1,600
Bangholm	Ex. Stn. Nappan	13	1,300	1	1,064	13·49	.....	
Bangholm	Ex. Stn. Kentville	8	1,000		1,956	11·50	.....	

CARROTS

Three varieties of carrots were under test and the same varieties have been compared for a three year period. These were also seeded with a corn planter in rows three feet apart and in quadruplicate plots $\frac{1}{100}$ acre in size. Thinning was done spacing the plants three inches apart in the row. The table following shows the yields obtained for the season as well as for the five year period.

CARROTS—TEST OF VARIETIES (DRY LAND)

Variety	Source	Yield per acre green weight		Yield per acre dry matter	Percentage dry matter	Average yield per acre (green weight) for 3 years
		tons	lb.	lb.		tons
White Intermediate	C.E.F. Summerland	7	250	1,442	10·23	16·8
Danish Champion	C.E.F. Ottawa	6	100	1,298	10·67	15·3
Large White Belgian	Rennie	7	200	1,491	10·47	14·3

TESTS CONDUCTED ON IRRIGATED LAND

CORN

Thirty-seven varieties of corn were tested for ensilage purposes, and of these eight have been under test for a period of five years. Corn variety tests have been in a rotation in which the preceding crop has been grain. A two-row corn planter has been used for seeding and the rows have been placed three feet apart. Seeding has been done at the rate of twenty pounds per acre in order to obtain a thick stand which was afterwards thinned so that the plants were left approximately ten inches apart in the row. One irrigation has usually been given at about the end of June and it has never been deemed necessary to irrigate a second time. This season there was ample moisture in the ground from the precipitation so that there was no necessity to irrigate.

CORN—TEST OF VARIETIES (IRRIGATED)

Variety	Source	Height of plant at harvest	Maturity at harvest	Yield per acre green weight	Yield per acre dry matter	Per cent dry matter	Average yield dry matter for past five years
		ft. in.		tons lb.	tons lb.		tons lb.
Longfellow	J. O. Duke	8 1	Early milk	26 1,200	3 1,983	15·11	4 1,357
Burr Leaming	Carter	9 6	Ears formed	20 1,500	3 394	15·49	4 1,099
Northwestern Dent	Disco	7 9	Milk	25 400	4 1,665	19·29	4 753
Compton's Early	J. O. Duke	8 5	Early milk	27 400	4 337	15·33	4 187
Golden Glow	J. O. Duke	8 8	Early milk	21 500	4 374	19·66	3 1,875
Northwestern Dent	Brandon	6 2	Ripe	9 1,400	3 411	32·94	3 1,882
Bailey	J. O. Duke	8	Milk	17 1,700	3 608	18·51	3 1,882
Leaming	J. O. Duke	8 10	Ears formed	20 1,100	3 1,085	17·21	3 1,537
Gehu	Disco	5 5	Dough	19 800	5 1,803	30·52	
White Flint (Stewart Strain)	Northland Seed Co	6	Glazing	20 200	5 841	27·21	
Quebec 28	Macdonald College	6 3	Glazing	18 1,400	5 528	28·03	
Dakota White Flint	O. Will	5 11	Late Flint	17 400	4 1,886	27·98	
Silver King	A. C. Popp	9 1	Milk	22 1,600	4 1,073	18·96	
Manitoba Flint	Man. Agr. College	6 2	Almost ripe	16 200	4 929	27·98	
Silver King	Disco	8 7	Early milk	24 300	4 886	18·26	
Mandan King	O. Will	6 2	Late dough	17 600	4 863	25·00	
Twitchell's Pride	D.E.F. Fredericton	6 8	Almost ripe	17 1,100	4 696	23·17	
Mercer	Northup King	8 1	Early dough	21 1,300	4 368	19·51	
Northwestern Dent	O. Will	7 2	Dent	13 800	4 13	29·75	
Mandan Zuni	O. Will	6 2	Early Dent	19 400	3 1,908	20·26	
Wisconsin No. 7	J. O. Duke	8 4	Ears formed	19 1,200	3 1,735	19·60	
Assiniboine Yellow	O. Will	5 9	Glazing	13 1,500	3 1,590	28·34	
Minn. No. 13 (Haney Strain)	Northrup King	7 2	Dent	13 1,300	3 1,450	27·22	
Square Deal	O. Will	6 2	Almost ripe	10 1,800	3 1,198	32·54	
Northwestern Dent	Lethbridge Ex. Stn	6 1	Ripe	10 300	3 1,150	35·24	
Minn. No. 13 X Howe's	Northrup King	6 8	Late Dent	12 1,100	3 1,149	27·62	
N.W.D. (Crookston St.)	Northrup King	7	Almost ripe	13 1,700	3 999	25·07	
Falconer	O. Will	6 1	Late Dent	14 400	3 567	23·11	
Minnesota No. 23	Northland Seed Co	5 10	Late Dent	10 200	3 401	37·45	
White Cap Yellow Dent	J. O. Duke	9 4	Early milk	21 300	3 279	14·87	
Pioneer	O. Will	6 4	Late Dent	10 400	3 59	29·79	
Brown Co. Dent	Northland Seed Co	6 5	Late Dent	10	3 8	30·08	
Northwestern Dent	C. P.R. Brooks	5 11	Ripe	9 400	3 5	32·76	
Manalta	Man. Agr. College	5 8	Ripe	9 300	2 1,864	32·57	
Minn. No. 13 (Double X)	Northup King	5 10	Late Dent	8 800	2 1,776	34·67	
Pride Yellow Dent	Disco	7 4	Late milk	13 200	2 1,750	21·97	
Howe's Alberta Flint	Lethbridge Ex. Stn	4 5	Ripe	6 1,100	2 1,580	42·92	

Of the varieties tested over a five year period the five highest yielding ones are tall growing sorts late in maturing. The table shows that none of them were further advanced than the milk stage at the time of harvesting. Although they excelled several other varieties in yield per acre of dry matter the quality of ensilage produced by them was inferior to that of some other varieties that had reached a greater degree of maturity. Northern grown strains of Northwestern Dent, such as the Brandon strain, or the Haney strain of Minnesota No. 13 will generally be found safer varieties to grow under average seasonal conditions. On account of the season being so unfavourable for corn the early flint varieties compared much more favourably with the dent varieties than they do in most seasons. Such varieties as Gehu and the white flint strains are the most suitable ones to grow where well matured ears are required for hogging-off purposes. Where late seeding is done or where the season is so short that corn can scarcely be relied upon to produce a satisfactory crop the Manalta and Howe's Alta Flint are most likely to prove satisfactory for hogging-off purposes.

FIELD ROOTS

Variety tests of mangels, sugar beets, swedes and carrots are made annually in quadruplicate $\frac{1}{100}$ acre plots. The past season was a particularly unfavourable one for root crops. The surface soil was so dry throughout the spring season that a great deal of the root seed failed to germinate. At the Station it was found necessary to irrigate the variety test plots in order to germinate the seed. The continued wet weather which followed immediately after irrigating made it difficult to control weeds and to thin at the proper time.

MANGELS

Five varieties of mangels have been under test for the past three seasons and the average yields of green weight obtained from them are shown in the table following. These were grown in quadruplicate plots 1/100 acre in size and the yields were determined by averaging the results of the four plots of each variety. Seeding was done with a two-row corn planter in rows three feet apart and the plants were thinned in the row to a distance of ten inches apart. The varieties included in the tests represent the different types of mangels in the market.

MANGELS—TEST OF VARIETIES (IRRIGATED LAND)

Variety	Source	Yield per acre green weight		Yield per acre dry matter		Percentage dry matter	Average yield per acre for 3 years (green weight)	
		tons	lb.	tons	lb.		tons	lb.
Yellow Intermediate	Steele Briggs	16	200	2	1,410	16·80	26	1,600
Mammoth Long Red	McFayden	6	400	1	170	17·54	23	1,600
Red Half Sugar	McFayden	5	500		1,628	15·47	23	1,400
Yellow Intermediate	McKenzie	8	600	1	440	14·69	23	200
Golden Tankard	Rennie	6	1,500		976	12·15	22	800

SUGAR BEETS

There were nine varieties of sugar beets tested for yield and purity. Seeding of these was done on April 27, with an ordinary beet drill, placing the rows twenty-two inches apart. All varieties were thinned on June 4 leaving the plants approximately ten inches apart in the row. A six inch irrigation was given on June 5. All varieties were harvested on October 6. The yield, per cent sugar, etc., are shown in the following table.

SUGAR BEETS—TEST OF VARIETIES (IRRIGATED)

Variety	Source	Yield per acre	Sugar in juice	Coefficient of purity
		tons	per cent	per cent
Dippe	Chemistry Division C.E.F., Ottawa	21·49	17·5	83·64
Commercial	Canadian Sugar Factories, Ltd	17·32	17·70	80·97
Fredericksen	Chemistry Division, Ottawa	15·24	17·03	81·36
9N	Amtorg Trading Co., N.Y.	15·19	18·95	84·31
Buszczynski	Chemistry Division, Ottawa	12·38	18·80	83·30
Kalnik	" "	11·93	18·17	83·10
Niemertche	" "	11·54	18·64	83·73
7E	" "	10·9	17·97	82·17
Ramon	" "	8·2	17·14	81·41

SWEDE TURNIPS

Seven varieties of swedes were tested and of these five have been grown for the past three years. Seeding was done on May 19, with an ordinary two-row corn planter, placing the rows three feet apart. The plants were thinned in the rows on June 12 to ten inches apart. Irrigating was done on May 31 and all varieties were harvested on October 10. The table following shows the yields, per cent dry matter, etc.

SWEDES—TEST OF VARIETIES (IRRIGATED)

Variety	Source	Yield per acre green weight		Yield per acre dry matter		Percentage dry matter	Average yield per acre for 3 years (green weight)	
		tons	lb.	tons	lb.		tons	lb.
Ditmars	McNutt	19	1,500	2	35	10·57	38	1,400
Magnum Bonum	Rennie	12	1,100	1	647	10·83	37	200
Bangholm	McKenzie	20	1,500	2	488	12·03	35	800
Canadian Gem	Rennie	15	800	1	1,522	11·44	33	600
Purple Top	Rennie	17	1,700	1	1,925	10·97	31	1,800
Bangholm	Nappan	14	200	1	1,416	11·14	.....	
Bangholm	Kentville	12	400	1	1,025	12·42	.....	

HAY CROPS

The more promising varieties or strains of alfalfa, clover and timothy are under test in duplicate 1/100 acre plots, and more definite data will be given when the yields from these can be averaged over a longer period of years. Two irrigations are generally given and two cuttings are made, one early in July and one early in September. Dry matter determinations are made from each cutting of the different plots and the yields are computed in tons per acre of dry matter.

The following figures show the yields per acre of green weight and dry matter of a few of the leading varieties for the past two years:—

RESULTS FROM DIFFERENT STRAINS AND VARIETIES OF HAY CROPS

Alfalfa	Variety	Source	Green weight per acre	Dry weight per acre
			tons	tons
	Cossack	Paramount Alfalfa Farm	27·53	4·52
	Cossack	Disco	25·78	4·31
	Grimm	Alberta Seed Growers	23·51	3·84
	Grimm	A. B. Lyman	21·82	3·78
	Medicago Felcata		21·57	3·37

Red Clover	Strain	Green weight per acre	Dry weight per acre
		tons	tons
	Central Experimental Farm	23·68	3·43
	Medium Late Swedish	28·24	3·38
	St. Clet	21·67	3·02
	Late Swedish	23·39	2·99

Timothy	Variety	Green weight per acre	Dry weight per acre
		tons	tons
	Huron	16·74	4·25
	Boone	17·01	4·14
	Gloria	16·54	3·63
	Primus	16·32	3·52

Investigational work is also being carried out with a few of the less important forage crops, such as kale, rape, artichokes, and soybeans, and results will be given concerning these when the tests have been conducted over a period of years.

FIELD HUSBANDRY

DRY LAND CROP ROTATIONS

The season of 1928 presented some unusual conditions for the dry land farmer, commencing as it did with an unusually dry May, and resulting in an unevenness in the germination, and ultimately in the ripening of the crop. June and early July had a record precipitation which promoted general high yields in cereal and hay crops, although much of the hay was injured and some even destroyed by the continuous rains of late June and early July.

Fodder corn was the only crop which produced subnormal yields, there being two factors promoting this condition. First the cool unduly moist weather was not favourable to rapid development of the corn plant, and the ground being in a wet condition for long periods prevented efficient weed control.

The summary of the results of the various rotations operated on dry land which are tabulated below have the following features of special note:

Field "A," which has been seeded to wheat each year since 1911, produced 20·3 bushels of low grade wheat, this plot having been cultivated until June 15, before being seeded to Garnet wheat. The long period of cultivation in the spring has become necessary, due to an invasion of wild oats and Canada thistle on this plot. However, the field returned a margin of profit over operating costs in 1928.

Rotation "B," a two-year rotation of summer-fallow and wheat, did not produce as well as could have been expected from the excellent condition of the soil. The low yield of this rotation for 1928 is accounted for by the fact that it is located just east of a block of open prairie where under the influence of the abundant rain fall of 1927, tumbling mustard grew abundantly, the winds carrying sufficient of the seed through the fence to effectively seed down the summer-fallow plot on rotation "B" prepared for 1928 crop.

Rotation "C," summer-fallow, wheat, wheat, shows the largest profit over operating cost of any of the rotations under way.

Rotation "T" is a complex rotation suitable to a specialized type of farming. The winter wheat field on this rotation was ninety per cent winter killed. The three fields of alfalfa for seed failed to set seed and the corn crop resulted in a loss on operating costs. However, this rotation returned a profit of $2.19 per acre, with eight of the ten fields being operated at a loss. This profit was due to the excellent yield of 87·68 bushels of oats after winter wheat and 58·28 bushels of wheat after corn. This was the highest yield of wheat on dry land reported for 1928.

Rotation "S" is a rotation designed to ensure a supply of fodder and at the same time allow for the maximum production of a cash crop. This rotation made a good return over operating costs.

Rotation "M" is a rotation designed for farms where live stock forms a major part of the farm operations. The field of winter wheat, which is the only direct cash crop in this rotation, resulted in a loss of $1.31 due to the heavy winter killing. This rotation produced a record oat yield for the year on dry land of 102·35 bushels per acre.

Rotations "J" and "Z." These rotations were started in 1921 with a view of determining the effect of legume and grass crops on crop yields and on soil fibre and its relation to soil drifting. Owing to the abundant moisture the field of sweet clover seeded on rotation "Z" in the spring of 1928 produced ·93 tons of hay in the same season.

Rotation "F" is a three year rotation started in 1926 using check rowed corn as a summer-fallow substitute followed by a cash crop, wheat seeded to sweet clover.

SUMMARY OF YIELDS AND PROFITS PER ACRE ON DRY LAND ROTATIONS

ROTATION "A"—WHEAT CONTINUOUSLY

Rotation year	Crop	Yields		Profit or loss (−)	
		1928	Average for 17 years	1928	Average for 17 years
				$ cts.	$ cts.
1	Wheat (Garnet)	20·20 bush.	13·67 bush.	9 36	4 49
	Field average per acre			9 36	4 49

ROTATION "B"—2 YEARS' DURATION

				$ cts.	$ cts.
1	Summer-fallow				
2	Wheat	34·10 bush.	27·01 bush.	14 98	10 41
	Field average per acre			7 49	5 22

ROTATION "C"—3 YEARS' DURATION

1	Summer-fallow				
2	Wheat	52·08 bush.	32·68 bush.	30 68	11 06
3	Wheat	27·08 bush.	*22·33 bush.	14 78	8 14
	Field average per acre			15 15	6 40

*5 year average (oats till 1923).
Previous average for 12 years 38·72 bush. oats.

ROTATION "T"—10 YEARS' DURATION

1	Summer-fallow				
2	Winter wheat	6·04 bush.	26·09 bush.	−10 53	5 70
3	Oats (Banner)	87·68 bush.	46·69 bush.	23 88	7 64
4	Alfalfa seeding			−6 86	−15 29
5	Alfalfa seed	Nil	37·05 lb.	−4 67	6 76
6	Alfalfa seed	Nil	29·80 lb.	−4 67	6 80
7	Alfalfa seed	Nil	21·09 lb.	−4 67	3 99
8	Summer-fallow				
9	Corn (N.W. Dent)	4·06 tons	*4·75 tons	−13 02	−4 04
10	Spring wheat	58·28 bush.	25·01 bush.	42 40	14 30
	Field average per acre			2 19	2 59

*13 years average. Previous average for 4 years 16·44 tons turnips.

ROTATION "S"—9 YEARS' DURATION

1	Summer-fallow				
2	Corn (N.W. Dent)	4·28 tons	7·38 tons	−21 86	−5 61
3	Winter rye	47·00 bush.	*23·06 bush.	25 20	13 68
4	Summer-fallow				
5	Wheat	35·47 bush.	26·94 bush.	8 77	6 81
6	Oats	77·88 bush.	42·56 bush.	15 67	5 48
7	Summer-fallow				
8	Peas and oats	3·89 tons	2·15 tons	1 17	−2 02
9	Wheat	45·33 bush.	26·89 bush.	29 19	3 28
	Field average per acre			6 46	2 40

*5 years average. Previously used as pasture.

ROTATION "M"—6 YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1928	Average for 17 years	1928	Average for 17 years
				$	$
1	Summer-fallow				
2	Winter wheat	23·73 bush.	25·88 bush.	−1 31	5 23
3	Oats (Banner)	89·41 bush.	44·46 bush.	19·47	6 17
4	Summer-fallow				
5	Peas and oats	3·66 tons	2·27 tons	−4 52	−0 33
6	Oats	102·35 bush.	50·94 bush.	26 83	7 93
	Field average per acre			6 75	3 17

ROTATION "J"—6 YEARS' DURATION

—	—	—	Average 7 years	—	Average 7 years
1	Summer-fallow	*1·02 tons			
2	Wheat, Reg. Marquis	41·33 bush.	31·60 bush.	20 10	10 11
3	Wheat	42·67 bush.	24·38 bush.	24 21	9 71
4	Oats, western rye, alfalfa	69·71 bush.	31·31 bush.	13 50	3 75
5	Hay	1·57 tons	0·89 tons	0 49	−1 95
6	Hay or pasture	3·01 tons	1·14 tons	8 82	1 55
	Field average per acre			11 19	3 86

*1·02 tons hay cut previous to ploughing.

ROTATION "Z"—5 YEAR'S DURATION

—	—	—	Average for 7 years	—	Average for 7 years
1	Summer-fallow				
2	Wheat, Reg. Marquis	53·17 bush.	31·39 bush.	24 35	7 40
3	Wheat	40·33 bush.	*33·83 bush.	21 92	6 36
4	Sweet clover seeded	† 0·93 tons	0·93 tons	−8 40	−8 14
5	Hay or pasture	‡ 1·23 tons	1·14 tons	−3 96	1 39
	Field average per acre			6 78	1 40

*Three years' average (oats in previous years). Four years' average for oats 21·69 bushels.
‡First cutting spoiled by rain.
†Result fron one year only, 1928 was the first year this field yielded a hay crop the year of seeding.

ROTATION "F"—3 YEARS' DURATION

—	—	—	Average for 2 years	—	Average for 2 years
1	Corn (N.W. Dent)	1·76 tons	0·88 tons	−11 75	−10 90
2	Wheat, seeded to sweet clover	43·67 bush.	30·38 bush.	29 25	19 30
3	Sweet clover	*1·27 tons	2·15 tons	−8 11	5 34
	Field average per acre			4 80	3 88

*First cutting burnt (destroyed by rain).

DRY LAND CULTURAL WORK

Eight cultural rotations were started on a piece of land which had been badly blown in 1926 and 1927. This land had been summer-fallowed for two years in an attempt to level out the soil drifts. All of the rotations were seeded on summer-fallow, consequently the yields have no comparative significance in 1928. A list of the new rotations is presented below.

Cultural Rotation 1. Plot—1. Summer-fallow.
" 2. Winter wheat.
" 3. Spring wheat, on spring ploughing.

Cultural Rotation 2. Plot—4. Summer-fallow.
" 5. Spring wheat.
" 6. Spring wheat, on spring ploughing.

Cultural Rotation 3. Plot—7. Summer-fallow.
" 8. Fall rye.
" 9. Spring wheat, on spring ploughing.

SUMMER-FALLOW TREATMENT AND STUBBLE TREATMENT

Cultural Rotation 4. Plot—10. Standard summer-fallow.
" 11. Spring wheat.
" 12. Spring wheat, burn stubble, disc. Cultivate in fifteen days, seed.

Cultural Rotation 5. Plot—13. Ploughless summer-fallow.
" 14. Spring wheat.
" 15. Spring wheat on spring ploughing.

Cultural Rotation 6. Plot—16. Ploughless summer-fallow.
" 17. Spring wheat.
" 18. Spring wheat, burn stubble in spring, disc, cultivate in 15 days, seed.

SWEET CLOVER FOR SOIL IMPROVEMENT

Cultural Rotation 7. Plot—19. Summer-fallow.
" 20. Wheat. Seeded sweet clover for hay the following year.
" 21. Wheat.

Cultural Rotation 8. Plot—22. Summer-fallow.
" 23. Wheat. Seeded to sweet clover to be ploughed down the following year.
" 24. Wheat.

SUMMER-FALLOW SUBSTITUTE

In 1917 a group of one acre plots was laid out with the object of determining the value of corn and potatoes intertilled as summer-fallow substitute. In 1921 after five years' results had been obtained with potatoes, this crop was changed to sunflowers which were grown until 1928. The substitute plants were seeded each alternate year to the various summer-fallow substitute crops, which were followed by a wheat crop. A straight summer-fallow crop was run as a check.

SUMMER-FALLOW SUBSTITUTES 1917 to 1928 INCLUSIVE

Year	Wheat after summer-fallow, yield per acre	Wheat after corn, yield per acre	Wheat after potatoes, yield per acre	Wheat after sunflowers, yield per acre
	bush.	bush.	bush.	bush.
1917	21·25	22·16	20·83	
1918	18·08	10·00	7·42	
1919	2.33	*Nil	*Nil	
1920	20·67	17·83	18·50	
1921	6·00	5·00	10·50	
Total	68·33	54·99	57·25	
Average for 5 years	13·67	10·99	11·45	
1922	15·16	11·00	.....	12·00
1923	†Nil	Nil	.....	†Nil
1924	22·50	22·83	.....	10·16
1925	27·00	28·66	.....	16·00
1926	25·00	20·00	.....	28·30
1927	35·17	32·83	.....	27·17
1928	57·67	40·33	.....	23·17
Total 1922–28	182·50	155·65	.....	116·80
Average for 7 years	26·07	22·24	.....	16·69
Total 1917–28	250·83	210·64		
Average for 12 years	20·90	17·55		

*Russian thistles. †Hail.

IRRIGATION ROTATIONS*

The 1928 yields of some of the crops on the two irrigated rotations were noticeably below the average. This was especially true of three of the alfalfa fields and the sugar beets on rotation "U" and the corn on rotation "X". The grain on rotation "U" was also slightly below the average. A temporary rise of the ground water table in the wet season of 1927 caused a partial killing of the alfalfa, and resultant low yields. The relative yields indicate the degree of killing.

The sugar beets came up well in early May and gave promise of a good crop, but just before the beets were ready to thin, cut-worms destroyed the entire crop. The field was reseeded on May 25, irrigated immediately after seeding and harrowed as soon as the ground was sufficiently dry. Almost a perfect stand was secured and the beets were thrifty throughout the season. The late seeding however made the season so short that the beets did not have an opportunity to produce large roots before growth was stopped by fall frosts.

The yield of corn on rotation "X" was adversely affected by several factors. Continued wet weather throughout the month of June and the first week of July prevented satisfactory weeding and cultivating. The damp cool weather also materially retarded the growth of corn. The greatest yield-reducing factor

* The work with irrigation and also with poultry and bees is under the supervision of A. E. Palmer, M.Sc., whose material assistance in the preparation of the report under these headings is gratefully acknowledged.

however, was the drying out of the plants which occurred in the period between the hard frost of September 8 and the cutting of the corn for ensilage on September 18.

The slightly reduced yields of grain crops on rotation "U" were due to lodging, which is usually experienced on the fertile soil of this rotation when excessive rain is received.

With the exceptions noted, all the crops were good and on none of the fields were there any indications of decreasing fertility. Not only have these rotations apparently kept up the fertility of the soil, but both have been quite satisfactory in controlling weeds. Each year's experience with these rotations shows more clearly the possibility of continued successful crop production on the irrigated lands of Southern Alberta if proper cropping practices are followed.

The tables in which the crop data are presented show the sequence of crops in these rotations. An annual application of twelve tons of manure per acre is given to one field of each rotation. This is applied on the alfalfa stubble of rotation "U" in the fall of the year before the alfalfa is broken. On rotation "X", the manure is applied on the barley stubble and ploughed under for the corn crop which follows. With this arrangement each field in rotation "U" receives an application of twelve tons per acre once in ten years and in rotation "X" once in fifteen years.

SUMMARY OF YIELDS AND PROFITS PER ACRE ON IRRIGATED ROTATIONS

ROTATION "U"—TEN YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1928	Average for 17 years	1928	Average for 17 years
				$	$
1	Alfalfa	3·00 tons	2·03 tons	4 42	7 48
2	Alfalfa	2·96 tons	3·54 tons	5 00	23 45
3	Alfalfa	3·87 tons	3·82 tons	11 00	26 76
4	Alfalfa	2·62 tons	3·03 tons	2 65	28 56
5	Alfalfa	1·64 tons	4·05 tons	−3 93	29 60
6	Alfalfa	3·22 tons	4·37 tons	7 48	32 00
7	Sugar beets	8·00 tons	10·13 tons*	10 00	116 69†
8	Wheat	42·3 bush.	46·96 bush.	20 56	27 68
9	Oats	90·3 bush.	91·18 bush.	12 21	17 54
10	Barley	48·8 bush.	51·84 bush.	4 99	11 24
	Field average per acre	.....	.....	7 44	32 10

* 6-year average.
†Average, 6 years beets, 11 years potatoes.

ROTATION "X"—FIFTEEN YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1928	Average for 14 years	1928	Average for 14 years
				$	$
1 to 5	Alfalfa	2·78 tons	2·80 tons*	3 31	13 91*
6 to 10	Alfalfa	3·11 tons	3·37 tons	5 61	23 80
11	Barley	60·00 bush.	44·34 bush.	11 56	12 07
12	Corn	3·48 tons	7·50 tons	−6 91	1 04
13	Wheat	61·5 bush.	38·00 bush.	37 86	17 77
14	Oats	96·2 bush.	66·56 bush.	16 81	8 12
15	Peas	20·8 bush.	21·86 bush.	24 55	15 19
	Field average per acre	.....	.....	8 57	16 18

*13-year average.

IRRIGATION EXPERIMENTS

Experiments were started at the Station in 1922 for the purpose of studying the effect of applying water to wheat at different stages of its growth. Sunflowers, alfalfa and potatoes were included in the experiment in 1923 and sugar beets in 1925. The work with sunflowers was discontinued after two years as it became evident that this crop would not be an important one on the irrigated farms of Southern Alberta. (For a description of the original plan of the experiment, see the report of this Station for 1925.)

At the close of the season of 1927, all the data secured were analyzed and prepared for publication. It was evident from this analysis that little additional information could be secured by continuing certain of the tests with wheat, potatoes and alfalfa so a number of these were dropped. The discontinuing of some of the tests made it possible to conduct the experiments with alfalfa in triplicate, instead of in duplicate as formerly. The wheat and potato plots were continued in duplicate but two sets of plots were arranged for each test, one set to receive the irrigation treatment specified, and the other to receive no irrigation during the year. In the next year the plots that received no irrigation the previous year would receive the various irrigations specified and the plots irrigated the previous year would not be irrigated. This method of having the irrigation tests conducted on plots that were not irrigated the previous year was found necessary to give a more uniform soil moisture content in the various plots used in the tests. Yield and other crop data will be secured on the plots not irrigated to obtain information on the residual effect of one year's irrigation on the crops of the succeeding year.

REVISED SCHEDULE FOR APPLYING WATER

The revised plan for the irrigation experiments adopted this year provides that alfalfa receiving but one irrigation shall be irrigated at the following periods: the previous fall, in early May, when plants are twelve inches high, and immediately after the harvest of the first crop. Where two irrigations are given, these are to be applied, first in the previous fall and after the first cutting, and second in early May and after the first cutting. Three irrigations are to be given, one in early May, one after cutting the first crop, and one after cutting the second crop. Four irrigations are given, one in early May, one when the first crop is eighteen inches high, one after cutting the first crop, and one when the second crop is eighteen inches high.

Three cuttings of hay are taken from the plots receiving three irrigations, and two cuttings from all other plots.

Wheat plots are given one, two or three irrigations. Those receiving one have this applied in the previous fall, in the three-leaf, the five-leaf, the shot-blade or the flowering stages of growth. One set of plots receiving two irrigations is irrigated in the previous fall and in the flowering stage, and one set in the five-leaf and flowering stage. One set receives three irrigations which are given in the five-leaf, shot-blade and flowering stages.

Potatoes are watered from one to five times in the season. The dates for applying the single irrigation are: in the fall, when plants are one-half grown, when plants are starting to bloom and twenty-one days after plants start blooming. Two irrigations are applied, one when the plants start blooming and one fourteen days later. The plots receiving three irrigations are watered when the plants start blooming and at intervals of twenty-one days, those receiving four are irrigated in the starting bloom stage and at intervals of fourteen days, and those receiving five have these applied when starting to bloom and at intervals of ten days.

Alfalfa and wheat receive six inches of water per irrigation unless heavy rains provide sufficient moisture for the crops' needs, in which event only three inches are given. Potatoes receive four inches per application when only one irrigation is given and three inches when irrigated more than once.

No change was made in the irrigation schedule of sugar beets.

CROP YIELDS WITH DIFFERENT IRRIGATIONS

ALFALFA.—Sufficient precipitation was received during the previous fall to keep the alfalfa growing in 1928 on the unirrigated plots until the heavy rains commenced on June 6. This resulted in a good first crop of hay on all plots regardless of irrigation treatment.

The rainfall was not sufficient to produce a good second crop, however, as the yields on the plots not irrigated were only about one-half those secured where sufficient water was applied. The plots irrigated in the previous fall only, gave but little better returns than the unirrigated plots. Those irrigated at any time during the growing season, however, all seemed to have sufficient moisture for both crops.

WHEAT.—One adverse moisture factor influencing the production of wheat in Southern Alberta this season, was the extremely dry May, which resulted in poor germination on many spring-ploughed fields. The wheat seeded on potato land in these tests germinated well, but all of the seed of the wheat sown on spring ploughed land that produced a crop of wheat the previous year, did not germinate until after the rains of early June. Sufficient germinated in May, however, to give a good stand and the plants that came up in June ripened before frost so that May irrigations did not improve yields, although they helped to give a more complete early germination.

In agreement with previous years' results, irrigation in the three-leaf stage, before the crop was high enough to shade the ground, did not decrease yields.

POTATOES.—For the first time in the history of the Station, the top soil on spring-ploughed land was too dry to promote good sprouting of potatoes. The dry condition of the soil caused many of the sets planted on the potato plots to dry up and rot, a condition that affected many potato fields of the district. As soon as the potatoes showed above ground, all vacant spots were replanted by hand.

The rainfall during the season of 1928 seemed ample for potatoes as there was no difference in yield that could be attributed to the variations in irrigation treatments.

SUGAR BEETS.—An infestation of cut-worms destroyed so many of the beets that comparative data could not be secured.

A summary of the results of the irrigation experiments conducted in preceding years may be found in the 1927 report of this Station.

WATER USED ON THE STATION FARM

A good indication of the irrigation requirements of crops during the season is shown by the water applied on the irrigated portion of the Station not included in the use of water experiments. A total of only 67·74 acre-feet of water was used: 36·55 acre-feet during the latter part of May and the first week in June and 31·19 acre-feet during the period from August 14 to August 25.

In the spring water was applied to the alfalfa which was not irrigated in the previous fall, to the mixed grass pastures, and to the lawns and gardens. The extremely dry weather of April and May also made it necessary to irrigate

up some grain planted on spring-ploughed ground as there was not sufficient moisture in the soil to germinate the seed, a condition seldom experienced in this locality. One field of sugar beets, destroyed by cutworms, was irrigated immediately after reseeding to facilitate germination.

The heavy rains of June and early July supplied sufficient moisture for all crops until August 14, when it was found necessary to apply water to the second crop of alfalfa. On August 25, before the irrigation of alfalfa was completed, heavy rains were again experienced, which supplied the required water to the crop, so that further irrigation was unnecessary.

No fall irrigation was done, although alfalfa fields not irrigated in August could have been fall irrigated to obviate the possible necessity of irrigating this crop the following spring.

The amount of irrigation water applied during the crop season of 1928 was less than that required in any one of the seven years that the total water used on the Station has been measured, except the season of 1927.

ACRE FEET OF WATER USED ON 196 ACRES OF LAND IN PERIODS OF 10 DAYS. 1922 TO 1928 INCLUSIVE

10 day period	1922	1923	1924	1925	1926	1927	1928	Average for seven years
May 1 to May 9	.....	6·02	.....	.....	4·53	.....	.....	1·51
May 10 to May 19	.....	3·97	3·64	1·60	12·04	.....	.....	3·04
May 20 to May 29	.....	7·82	17·50	1·50	29·54	.....	23·34	11·39
May 30 to June 8	7·28	8·58	13·54	8·03	25·66	.....	13·21	10·90
June 9 to June 18	17·68	6·29	3·72	20·51	24·93	.....	.....	10·45
June 19 to June 28	21·41	2·08	2·60	20·64	2·30	.....	.....	7·00
June 29 to July 8	6·91	5·21	27·41	14·81	1·15	.....	.....	7·93
July 9 to July 18	4·99	21·52	33·04	15·10	9·89	0·61	.....	12·16
July 19 to July 28	46·81	15·08	22·41	20·85	20·41	4·73	.....	18·61
July 29 to Aug. 7	21·94	30·23	11·65	18·32	15·42	17·60	.....	16·45
Aug. 8 to Aug. 17	19·99	23·46	1·36	25·59	7·81	10·70	18·04	15·28
Aug. 18 to Aug. 27	11·96	14·40	0·39	13·10	0·92	.....	13·15	7·70
Aug. 28 to Sept. 6	1·30	1·91	0·26	0·52	8·05	.....	.....	1·72
Sept. 7 to Sept. 16	.....	1·81	.....	7·28	4·10	.....	.....	1·88
Sept. 17 to Sept. 26	.....	.....	1·22	.....	.....	.....	.....	0·17
Sept. 27 to Oct. 6	.....	2·00	10·40	.....	.....	.....	.....	1·77
Oct. 7 to Oct. 16	19·25	50·34	14·07	4·68	.....	.....	.....	12·62
Oct. 17 to Oct. 27	.....	13·03	15·36	.....	.....	.....	.....	4·06
Total	179·52	213·75	178·57	172·53	166·75	33·64	67·74	144·64

HORTICULTURE

The season of 1928 was, on the whole, favourable for horticultural work. The unusually dry weather that prevailed during the month of May interferred seriously with the germination of small seeds, so that a great many vegetables, and flower seeds sown in the open, were late in starting. The copious rains from the beginning of June right through the season produced a luxurious growth everywhere. Irrigation was never really needed so dry land gardens in the district were as good as irrigated gardens. On account of the frequent rains during the summer, with the attending cooler weather, the more tender vegetables were slow in developing. The slight frost registered on August 14, (an occurrence very unusual for the vicinity of Lethbridge) did no noticeable damage. The average date of first frost in the fall at this Station is about September 10. This year a killing frost occurred on September 8. It can therefore be seen that although the season was favourable in many ways, there were drawbacks.

Trees and shrubs of all kinds came through the winter in good condition, very little winter injury being noticeable in the spring. Tree and bush fruits produced a fair crop of fruit. Flowering shrubs bloomed well.

DRY LAND

In addition to the irrigated garden, there is a dry land garden for the purpose of demonstrating the possibilities of gardening for the dry land farmer. It consists of a vegetable garden, a small fruit plantation and an apple orchard.

Owing to the generous rains the dry land vegetable garden was inferior in no way to the irrigated garden, consequently there will be no occasion to detail the results obtained from the various kinds of vegetables under test, as differentiated from the irrigated garden. It might be timely to again point out the desirability of preparing the land for a dry land vegetable garden a year in advance by summer-fallowing. It is common knowledge that the best grain crops are grown on summer-fallow but it is not so generally realized that the best garden crops can be raised also on summer-fallow. In a dry season when the carry-over of water in the subsoil is an important factor in the growing of crops, garden vegetables will do better on summer-fallow than on land on which vegetables had been grown the year previous. A good practice is to have half the garden patch in summer-fallow each year. The time to apply manure is in the winter or early spring before the ploughing for the fallow is done. In this way the manure is ploughed under a full year before the crop is grown on the land and so is given a good chance to become well incorporated in the soil. Manure applied in this way increases the ability of the soil to retain moisture, besides improving its tilth. The practice of applying manure on non-irrigated land the same year that a crop is to be grown usually proves disastrous.

The possibilities of success of a vegetable garden on dry land are greatly improved when the garden is protected with a good windbreak. Not only does this hold the snow during winter, but it is a protection against wind and soil-drifting. Summer mulching of the wind-break to control weeds with manure eight or nine inches deep and extending six to ten feet out on either side is a practice that may be recommended on dry-land. This might be done when farming operations are slack, but before the growth of too much vegetation.

SMALL FRUITS

As has been mentioned in previous reports the small fruits on the dry land are protected on the west side by a caragana windbreak. Not only are the bushes protected from the heavy winds but the windbreak catches all the snow that otherwise would be drifting elsewhere. The currant bushes are planted six feet apart in rows, and the rows are eight feet apart. This allows ample room for horse cultivation even though the bushes have been set out for a number of years. Currant bushes need some care if good results are to be looked for. A mulch of well rotted barnyard manure spread over the plantation in the fall and worked well into the soil in the spring will be found very beneficial. It is important that currant bushes be pruned. A neglected plantation will soon become full of dead branches, and the size of the fruit, if any, will get smaller.

PRUNING.—The black and red currants bear most of their fruit on wood of different ages, so the pruning of one is a little different from the other. The black currant bears fruit on the previous year's growth and it is important always to have a plentiful supply of one-year-old healthy wood. The red and white currants produce their fruit on spurs which grow from wood two years or more of age. With a little pruning done annually the bushes can be kept in shape and also will allow the light and sunshine to get in among the bushes which is very important at picking time, should the weather be wet.

The yields from the dry land black and red currants were fair again this year. The yields obtained from twelve bushes of each variety are as follows:—

Black Currants:—	
Merveille de la Gironde	37 pints.
Saunders	25 pints.
Eagle	21 pints.
Red Currants:—	
New Red Dutch	97 pints.
Red Grape	133 pints.
Cumberland	120 pints.

Raspberries.—The variety Herbert yielded 108 pints from a 210 foot row.

Gooseberries.—Houghton is the variety being tested out, yielding 61 pints from 35 plants.

Apples.—Several of the apple trees produced a small amount of fruit.

IRRIGATED LAND

VEGETABLES

To permit earlier seeding in the spring, and to ensure a better germination, fall ploughing is practised. It has been found that thorough surface cultivation immediately following the ploughing is desirable, for if a lumpy surface is left in the fall it is almost certain that the soil will be in the same condition the following spring.

BEANS.—Nineteen varieties were sown on May 18. On account of the dry weather the seed did not germinate until June 16. They were ready for use on August 10. The recommended varieties with yield of green beans, from a thirty foot row are: Round Pod Kidney Wax 27½ pounds, Masterpiece 28 pounds, Canadian Wonder 22 pounds, Davis White Wax 20 pounds, Pencil Pod 25 pounds, Hodson Long Pod 19½ pounds, Sure Crop Stringless Wax 23 pounds.

BEETS.—Twelve varieties were sown on April 23 and all did exceptionally well and were ready for use on July 15. The following yields were obtained from a thirty foot row: Black Red Ball 56 pounds, Detroit Dark Red 50 pounds, Early Wonder 80 pounds, Early Flat Egyptian 63 pounds, Improved Dark Red 63 pounds, Early Model 45 pounds.

BRUSSELS SPROUTS.—Five varieties were under test. The seed was sown under glass on March 24 and the plants set out in the open on June 9. With a cool season and moisture in abundance they did better than usual. Of the varieties grown Dalkeith proved to be the heaviest yielder. For the best results it is advisable to sow seed not later than March 25, as this delicious vegetable requires a long season.

CABBAGE.—Twenty-seven varieties were grown. At the time of planting in the field it was very dry, therefore it was necessary to irrigate. With the heavy rainfall that followed early in June added to the irrigation, some of the varieties suffered on account of the soil becoming water-logged and heavy. The following yields were obtained from a double thirty-foot row:—*Early Varieties,*—Copenhagen Market 224 pounds, Golden Acre 194 pounds, Jersey Wakefield 134 pounds, Babyhead 125 pounds. Babyhead does not grow very large heads, but very solid and suitable for the table. *Midsummer Varieties,*—Kildonan 210 pounds, Midseason Market 130 pounds, Northern Favorite 180 pounds. *Late Varieties,*—Extra Amager Danish Ballhead (0-8620) 259 pounds, Danish Ballhead Solid Emperor 120 pounds. The last two named varieties are highly recommended for winter storage.

CAULIFLOWER.—Four varieties were under test and all did fairly well, forming good solid heads. Cauliflower requires more care than cabbage if a good crop is looked for. In the seed bed it is liable to damp off more quickly than cabbage, and it will not stand as much cold when planted in the field. Therefore if set out early the young plants must be well hardened off. Dry hot weather is hard on cauliflower and if they head at all under such conditions, the heads are apt to be small and hard. For best results about the middle of June is the best time to plant out in the open, and by the time the plants are forming heads the weather will be cooler, thus giving them better conditions under which to develop. The two earliest varieties were Early Snowball and Early Dwarf Erfurt. Danish Perfection was two weeks later.

CELERY.—Twelve varieties were grown. The plants made strong growth. The recommended varieties in order of yield from a fifteen-foot row are: Paris Golden Self Blanching, 44 pounds; Golden Plume 43 pounds; Emperor, 40 pounds; Easy Blanching, 39 pounds; White Plume, 37 pounds; Columbian, 32 pounds; Paris Rose Ribbed, 30 pounds.

CUCUMBERS.—The season of 1928 was exceptionally cool for cucumbers. During the month of June and July all the eight varieties under test made but little growth, but in August the vines developed normally and there would have been many more cucumbers had frost not come so soon. The varieties recommended with number of cucumbers from three hills are: Improved Long Green 46, Davis Perfect 49, Early Fortune 48, Double Yield which was a novelty did very well considering a yield of 58 large cucumbers.

CORN.—Twenty-one varieties were tested and they all reached the roasting ear stage. Although the corn plant will not stand much frost, experience has taught that much earlier planting is desirable than was the practice in previous years. The first week in May, or even the last of April, is a good time to plant sweet corn in the Lethbridge district. Should frost injure the leaves after the plant is up no real harm may be anticipated provided the plant is not entirely killed in which case replanting will have to be resorted to. The earliest varieties recommended with yields from 20 hills are: Banting 91 cobs, Pickaninny 88 cobs, Sixty Day Golden 73 cobs, Sunshine 73 cobs. *Later Varieties:* Golden Bantam 84, Golden Giant 80 cobs, Howling Mob 63 cobs. The selection of home grown seed is recommended. By saving the earliest ears of corn year after year an early strain can be obtained. A simple way is to mark the earliest ears by tying a piece of cloth on them. Allow them to become as mature as possible but they should be picked before a killing frost. The ears should be hung up to dry until late fall or early winter in a warm dry place away from danger of frost. The corn should not be shelled from the ears until planting time.

CITRON.—Two varieties were grown. The season of 1928 was not favourable in this district for this crop. The plants made very little headway during the cool, wet weather in June and July.

KOHL RABI.—Two varieties were tested and both did exceptionally well. Kohl Rabi is not as well known as it should be. It is a very easy plant to grow, also hardy. The seed can be sown in drills, and plants thinned to stand about ten to twelve inches apart. If used before it becomes tough, it is an excellent vegetable. The yields obtained from a thirty-foot row are: Improved Green Goliath 68 pounds, and White Vienna 53 pounds.

LETTUCE.—Twelve varieties were grown consisting of loose leaf, head and Cos. Lettuce does best under fairly cool conditions, and is most successfully grown out-of-doors during spring and fall. It is inclined to run too quickly to seed in hot weather. Successive sowings at two weeks intervals will give a steady supply of fresh lettuce throughout the summer. The varieties recommended with yield from a fifteen-foot row are: Grand Rapids (Leaf) 13 pounds, Wonderful (Head) 10½ pounds, Toronto Gem (Head) 20 pounds, White Paris (Cos) 12 pounds, Trianon (Cos) 17 pounds.

LEEKS.—One variety, Musselburgh, was grown which did exceptionally well. The yield from a thirty-foot row was 20 pounds. Frost does not harm the leek, but really improves the flavour.

MUSKMELON.—The following six varieties were tested: Emerald Gem, Golden Champlain, Muscat Oka, Paul Rose, Page Early, Orange Flesh, but none of them matured.

ONIONS.—Seventeen varieties were grown. Most of the varieties ripened up well before late fall. Onions require a long season and seed should be sown as early as possible in the spring. Early and extra early sorts only should be used. The seed bed should be well pulverized and smooth and firm. The onion maggot is troublesome in this district, and it is advisable to sow plenty of seed in order to insure a fair stand. The recommended varieties with yield from a thirty-foot row are: Australian Brown 20 pounds, Large Red Wethersfield 23 pounds, Giant Prizetaker 27 pounds, Southport Red-Globe 23½ pounds, Danvers Yellow Globe 20 pounds, White Barletta 18 pounds. The last named variety is an excellent pickling onion. In sowing seed for pickling, seed should be sown at the rate of thirty pounds to the acre.

PEAS.—Fourteen varieties were grown. All were picked green. The recommended varieties with yield from a thirty-foot row are: Little Marvel 24 pounds, Tall Telephone 21½ pounds, Gradus 25½ pounds, Thomas Laxton 22 pounds, Stratagem 24 pounds.

PARSLEY.—Three varieties were grown, Moss Curled, Triple Curled and Vaughan XXX, and made strong growth. A limited supply of fresh parsley during the winter can be had by lifting one or two plants from the garden in the late fall and potting them. These serve as attractive looking window pots, and will supply small quantities of parsley for garnishing purposes.

PARSNIP.—The three varieties under test made good growth and all were smooth and of nice shape. The following yields were obtained from a thirty-foot row of each variety: Hollow Crown 87 pounds, Guernsey 82 pounds, Intermediate 48 pounds. Parsnips can be left in the ground all winter and in the spring are of better flavour than those in storage. Parsnips like carrots and beets keep better in the cellar if kept buried in moist soil.

POTATOES.—Thirteen varieties were under test. They were planted on May 16, and they were dug September 28. The season of 1928 did not prove satisfactory for the potato crop in the Lethbridge district. At the time of planting the land was very dry and with no rainfall. During the month of May, fifty per cent of the sets died but those that did survive were of good size and well shaped. The yields from one-hundredth part of an acre of each variety were:—

POTATOES—RESULTS OF VARIETY TEST

Variety	Yield of marketable potatoes	Yield of unmarketable potatoes	Colour	Earliness
	lb.	lb.		
Carmine No. 1	130	25	Creamy white	Late
Early Eight Weeks	85	20	Rose	Early.
Great Scott	157	55	Creamy white	Late
Early Ohio	65	25	Light pink	Early.
Netted Gem (own seed)	81	45	Russet brown	Late.
Gold Coin	78	25	Creamy white	Late.
Wee McGregor	16	40	Creamy white	Late.
Fletchers No. 2	80	75	Pink	Late.
Rural Russet	154	65	Russet brown	Late.
Cambridge Russet	125	33	Russet brown	Late.
Reeves Rose	139	16	Light rose	Late.
Suttons Abundance	100	30	Creamy white	Late.
Russet Burbank	165	45	Russet brown	Late.
Irish Cobbler	70	40	Creamy white	Early.
Fletcher No. 3	30	20	White	Early.
Netted Gem Invermere	12	25	Russet brown	Late.
Fletcher No. 1	16	27	Pink	Early.

RADISH.—Seven varieties were grown, all doing exceptionally well. Successive plantings made every week or ten days will ensure a steady supply. The varieties recommended with yield from a 30-foot row are: Saxa, 13½ pounds; Icicle, 20 pounds; Scarlet Turnip White Tipped, 13 pounds. The first-named variety being the earliest for the past two years. It was ready for use 27 days from time of planting.

RHUBARB.—Two varieties were under test, namely Victoria and Ruby No. 10, both varieties making strong growth. Rhubarb should occupy a position in every farm garden on account of its early productiveness in the spring. It has been mentioned in previous reports that rhubarb plants on the Station will remain fairly vigorous for about four years when they will start to deteriorate, quickly producing small stalks. Hence the necessity of starting a new plantation. Rhubarb seed can be sown in the early spring, at the same time as onions or carrots. As soon as the seedlings appear above the ground the flea beetle unfortunately commences to destroy them. To overcome this, plants should be dusted as often as necessary with Paris green in the proportion of one pound of Paris green to five pounds of slaked lime. Young rhubarb plants, if well dusted when they are young and well cultivated during the growing season, should make a growth of from 12 to 18 inches the first year. In the fall the plants should be lifted and planted in their permanent location, two feet apart in rows four feet apart, or on dry land double this distance. The crop should be allowed to grow for two years before being harvested too heavily.

FORCING RHUBARB.—Two-year-old roots were dug in the late fall just before freeze up and stored in some place convenient to the forcing cellar or basement. After the roots have been allowed to freeze place them on the floor of the cellar, buds up, packed closely together. Fill in between the plants with soil or sand, which should be kept moist. Under these conditions with a temperature of 45 to 50 degrees Fahrenheit rhubarb can be had large enough for table use in eight weeks' time.

SWISS CHARD.—Swiss Chard has never become a popular vegetable in Southern Alberta although it thrives well and has always produced a satisfactory crop at this Station.

SALSIFY.—Oyster plant is the name often applied to this vegetable on account of it giving soups or stews a distinct oyster flavour. Freezing in the fall improves the quality and flavour of the roots. Seed is sown in drills in the early spring and plants are thinned to three or four inches apart. The plants are dug in the fall and the roots stored in the cellar in sand. The variety grown was Mammoth Sandwich Island, yielding from a thirty-foot row 72 pounds.

SPINACH.—Five varieties were under test. The spring of 1928 was favourable for this crop, all varieties doing well. The recommended varieties are Noble Goudry, King of Denmark, and Juliana.

SQUASH.—Thirteen varieties were grown. The season was rather cool for this crop and but very few squash matured. The varieties which did best were English Vegetable Marrow, Long White Bush Marrow, Golden Hubbard, Green Hubbard, Warty Hubbard.

TOMATOES.—Tomato seed is sown under glass in the latter part of March or early in April. Care should be exercised to see that the plants are well hardened off in a cold frame before planting out in the open. This is generally done about the first week in June. Two methods of raising tomato plants have been tested for a number of years. The first method is to raise the plants in flats with the plants placed about two inches apart. The second method is to prick the seedlings into two-inch pots and gradually transplant to larger pots until a six-inch size is reached. The latter method produced the strongest plants and on account of being grown in pots could be transplanted into the open with the least possible shock to the plant. The best results, both as to earliness and yield, were obtained from this method.

PRUNING.—The season in this district is short for this crop, and pruning to a single stem has been found to be conducive to early ripening. In order to produce a single stemmed plant the side shoots, or suckers, must be pinched off. When five or six bunches of flowers have set on each plant the terminal bud may be pinched off. This throws the whole growth into the ripening of the fruit.

If frost threatens the plants may be pulled up by the roots and hung in a cellar or basement, where most of the tomatoes will ripen. Forty-two varieties were tested out. The season of 1928 being very short only a few of the earliest varieties did well. Those recommended, with yield from five plants, are: Bonny Best, 11½ pounds, Alacrity x Hipper, 12 pounds, Alacrity, 10 pounds, Carter Sunrise, 13 pounds, Earliana, 9 pounds, Self Pruning, 12 pounds.

TURNIP.—Five varieties were under test. The following yields were obtained from a thirty-foot row: Perfection, 60 pounds, Good Luck, 49½ pounds, Northwestern Swede, 25 pounds, Orange Jelly, 31 pounds, Red Top Strap-Leaf, 35 pounds. Turnip is a cool weather crop and does best in the spring and should be used before they grow too large or they will become spongy.

WATERMELONS.—Three varieties were grown but owing to the season being too cold none matured. The varieties grown were: Harris Earliest, Phinney Early, Cole Early.

SMALL FRUIT (Irrigated)

The new plantation of black, red and white currants was planted in the fall of 1923 and has been producing fruit for the last three years. The rows are eight feet apart and plants are six feet apart in the rows, thus giving plenty of room for horse cultivation. The varieties with yields from eight bushes were:—

—	Variety	Yield
		pints
Black currants	Bang Up	26
"	Topsy	37
"	Eagle	37
"	Saunders	41
"	Ontario	40
"	Magnus	45
Red currants	Red English	42
"	Frauendorfer	36
"	New Red Dutch	51
"	Moore Seedling	29
"	Raby Castle	68
"	Prince Albert	37
White currants	White Kaiser	18
"	Large White	9

RASPBERRIES.—As mentioned in previous reports the old plantation has been dug out after being carefully tested for a number of years. A new plantation was started in the spring of 1926, three varieties, Herbert, Newman and Ohta being used. Two rows 30 feet long, rows eight feet apart and plants two feet apart in rows were set out of each variety. It has been mentioned in previous reports that to be successful in growing raspberries in this district, it is necessary to cover the canes over with moist soil during the winter. By planting the rows eight feet apart it is possible to do most of this work of covering by the use of a plough and Martin ditcher, after the canes have first been bent over and fastened down by hand. A little shovelling may have to be done in places where it is not properly covered. Care should be taken in the spring to see that the uncovering is done at the proper time. It is a wise plan to examine the canes occasionally for as soon as the buds begin to swell the canes should be uncovered otherwise a large number of fruit buds will break off during the uncovering process.

GOOSEBERRIES.—Seven varieties are under test but only three of these will come through the winter without winter protection and as there is not a great demand for gooseberries only the hardy varieties should be grown. The varieties recommended for this district with yields are: Houghton 35 pints from 9 bushes, Carrie 22 pints from 12 bushes, Alma 19 pints from 6 bushes.

STRAWBERRIES.—Senator Dunlap was the variety grown. It is particularly hardy, a vigorous grower, and a heavy yielder. The fruit is of good size and quality. In planting out a new strawberry patch under irrigation the single row method is recommended. The plants are set out eighteen to twenty-four inches apart in rows, and rows 2½ to 3 feet apart. After the plants commence to make runners, it is best to prevent the young plants establishing themselves closer than about 9 or 10 inches apart in the row. All surplus runners should be removed as it is very difficult and a tedious job to keep the patch in good condition if runners are allowed to take root anywhere.

TREE FRUITS

APPLE.—Both the standard and cross-bred apples came through the winter in fine shape. As usual, a heavy crop of fruit was produced by the cross-breds. Some of these varieties did exceptionally well. The one that produced the most

fruit this season from a single tree was the Osman which yielded 374 pounds of crab apples. The fruit of this variety is rated as excellent for jelly, and the tree itself is extremely hardy.

The standard apples did not do quite as well this year as last year, although there are a few varieties which produced some good sized, well matured fruit. Lethbridge was never destined to become an apple producing district from a commercial standpoint, but it is hoped that a hardy variety may be found that would be suited to be planted on the home garden. The varieties doing well so far are: Yellow Transparent, Patten Greening and Hibernal.

PLUMS.—There was considerable winter killing among the named varieties of plums in the fall and winters of 1927 and 1928, but the wild plum of Manitoba which has proved itself to be hardy, produced a heavy crop.

TREES AND SHRUBS.—The trees and shrubs came through the winter in excellent shape. The flowering shrubs bloomed freely making a bright show of colour.

FLOWERS

ANNUALS.—A new border was made this year for testing out the varieties. Fifty-seven different varieties were grown. The season proved particularly favourable, giving a continuance of bloom. Most of these were started under glass on March 27 and planted in the open on June 5. Although some varieties of annuals can be sown out-of-doors, it is advisable to start a number of varieties in-doors so as to get earlier bloom. This would include: Antirrhinum, Aster, Phlox, Petunia, Stocks, Lobelia, Salpeglossis, Marigold, Zinnia. Some of the varieties that can be seeded successfully outside are: Shirley Poppy, Candytuft, Nasturtium, Larkspur, Lavateria, Mignonette, Calendula and Sweetpeas.

PERENNIALS.—The value of perennials lies in the fact they can produce a wealth of bloom year after year with very little care after they once become established. All they require is an occasional hoeing to keep down the weeds and to loosen the soil. After the plants have been cut down in the fall a mulch of manure can with advantage be spread over the border and this can be dug in the following spring. Some of the varieties to be recommended are: Gypsophila or Baby's Breath, Aquilegia, Pyrethrum, Peony, Poppy, Pink, Lupin, Lychnis, Phlox, Shasta Daisy, Delphinium, Sweet William Campanula, Iris, Golden Glow, and Holyhock Veronica.

POULTRY

Only one breed, the Barred Plymouth Rock, is used in poultry work at this Station. Being hardy and prolific this breed has proved to be well suited to Alberta conditions.

The feeds and methods of feeding except for those birds in special feeding tests, were much the same as in former years. The winter scratch ration was composed of two parts wheat to one each of cracked corn and crushed oats. A small portion of this was fed in the morning and the balance about one hour previous to the birds going on the roosts. The dry mash, which was available to the birds at all times, consisted of equal parts of bran, shorts, low grade flour, cornmeal, oat chop and meat scrap, to which was added a little bonemeal, linseed meal, charcoal and fine salt. A moist, crumbly mash consisting of one and one-half parts of cornmeal, one and one-half parts of oat chop, one part shorts, one part bran and one per cent of cod liver oil was fed at noon every day. The amount fed was as much as the birds would eat in about ten minutes. Green feed consisted of cabbage, alfalfa leaves, mangels, turnips and beets. This was augmented in the spring and summer by growth in the runways which were seeded to a mixture of wheat, oats and barley. The summer scratch feed was changed gradually to three parts wheat to one each of cracked corn and crushed oats.

POULTRY HOUSE TEMPERATURE

Daily maximum and minimum temperatures were secured each day from November 1, 1927 to May 17, 1928, inclusive in the building used to house the Alberta Egg Laying Contest.

This building was carefully constructed to provide comfortable quarters for the pullets entered in the contest. The house is of shed roof type with double walls and ceiling packed with six inches of planer shavings. It is twenty feet deep and eighty-four feet long and is divided with tight, single board partitions, into rooms fourteen feet wide. Each room accommodates sixty heavy breed birds or seventy-two of the light breeds.

The front of the house is one-third lumber and the balance glass and cotton. A door opens outside from each room. Ventilation is through adjustable cotton and glass windows and on warm days the door is left open. No artificial heat is provided.

In the following table are presented the maximum and minimum temperatures recorded in the house and the corresponding temperatures taken in the shade outside. The thermometers in the poultry house were placed in the east end room on the inside wall just in front of the roosts on a level with the birds when at roost.

The lowest temperature recorded in the building was 21° F. above zero, with an outside temperature of 34° F. below zero. The same night that this temperature was recorded a comparable minimum thermometer showed 3° below zero in a gable roofed house with straw loft and unpacked walls. This house is 16 by 32 feet in size and contained one hundred Barred Rock pullets.

At no time during the winter did the birds in the contest appear to be uncomfortable from the cold, no combs were frozen and there was not the decided drop in production that was experienced in colder houses when extremely low temperatures prevailed.

From the standpoint of temperatures this house seems to be warm enough for the birds' comfort. Whether or not there is sufficient ventilation is more difficult to determine. No more colds were experienced in the flock than in previous years when the birds were kept in more open houses. The straw litter got damp more quickly than in the colder houses but the difficulty from this cause was not extreme.

It is planned in the future to study the ventilation of this building more in detail by testing the carbon dioxide content and the humidity of the air and noting the continued performance of the birds.

MAXIMUM AND MINIMUM TEMPERATURE IN THE ALBERTA EGG LAYING CONTEST HOUSE, CORRESPONDING SHADE TEMPERATURES OUTDOORS AND THE DIFFERENCE IN THESE TEMPERATURES FOR EACH MONTH FROM NOVEMBER 1927 TO MAY 1928, INCLUSIVE.

Month	Monthly maximum temperature			Monthly minimum temperature		
	Outside	Inside house	Difference in temperature	Outside	Inside house	Difference in temperature
	° F.	° F.	° F.	° F.	° F.	° F.
Nov.	52	50	2	−15	28	43
Dec.	43	54	11	−34	21*	55
Jan.	59	61	2	−33	24	57
Feb.	51	63	12	−22	30	52
March	70	71	1	6	34	28
April	77	72	5	13	32	19
May**	83	77	6	31	43	12

*Temperature inside a gable roofed straw loft house—3°.
**Records discontinued after 17th of May.

BARLEY VS. CORN FOR LAYING PULLETS

An experiment has been conducted for four years to test the relative value of barley and yellow corn as ingredients in the scratch grain and mash fed to laying pullets in an endeavour to find a cheap home-grown feed that could be used to replace imported corn.

Pens of fifty Barred Rock pullets were used except in the last year of the experiment when but twenty-five pullets were available for each pen of the experiment. The feeds and feeding methods were the same as those used for the balance of the Station flock, as already described in this report, except that the corn fed pen received no cod liver oil and the pens fed barley received no corn, barley having been substituted for the corn in both the scratch feed and the mash. The barley used in the scratch was cracked and that used in the mash was finely ground.

In the first two years of the experiment no cod liver was fed, but during the last two years one barley fed pen had one per cent of cod liver oil added to the wet mash fed each day.

AVERAGE EGG PRODUCTION PER BIRD IN TEN MONTHS AND PER CENT MORTALITY IN PENS FED CORN, BARLEY OR BARLEY AND COD LIVER OIL FOR EACH OF FOUR YEARS, 1925 TO 1928 INCLUSIVE

Year ending September	Egg production in 10 months			Per cent mortality†		
	Corn	Barley	Barley and cod liver oil	Corn	Barley	Barley and cod liver oil
1925	201*	174*	.....	18	46	.....
1926	149	147	.....	8	8	.....
1927	153	147	159	16	35	33
1928	156	150	158	4	24	16
2 Year Average 1927-1928	154	148	158	10	29	24
4-year average 1925-1928	165	154	.....	11	28	.....

*Egg production for twelve months.
†Accidental deaths not counted.

The data presented in the table show that in every year except 1926 there was a greater mortality in the pens receiving barley than in those receiving corn. In the two years that cod liver oil was used the mortality in the pens fed barley and cod liver oil, was less than where barley without cod liver oil was given but was noticeably higher than the mortality in the corn fed pens. From the accumulated data and the observations of the birds while the experiment was in progress it would seem that the barley fed was decidedly inferior as a poultry feed to corn, especially if the supplementary feeds high in vitamine "A" were not fed. This was especially evident in the first two years of the experiment when no special care was taken in selecting well cured alfalfa and other supplementary feeds known to be high in this vitamine. In those years many of the birds fed barley without cod liver oil showed exaggerated symptoms of vitamine "A" deficiency and in the first year of the experiment a number of birds died apparently from this cause. When care was taken to feed well cured alfalfa or cod liver oil was added to the ration no head swellings nor throat lesions were observed.

The egg production of the corn fed pen was greater than that of the pen fed barley without cod liver oil in each year of the experiment and the average for the four years was seven per cent more. When cod liver oil was added to the barley the egg production was slightly more than was received from corn.

Other experimental projects with poultry were under way and reports of these will be made as the data warrant.

EGG LAYING CONTEST

The ninth Alberta Egg Laying Contest closed on October 22. The Contest was shortened this year to fifty-one weeks instead of fifty-two as formerly, as it was found necessary to give the contest management one week before the new contest commenced, to attend to the tattooing of registered birds and the cleaning and disinfecting of the buildings.

Thirty-two pens completed the 357 days of the test with an average production of 169 eggs and 169.5 points.

FINAL STANDING OF THE TEN LEADING PENS AND BIRDS

Leading Pens

Number	Owner	Address	Breed	Eggs	Points
1	G. E. Harp	Shouldice, Alta	S.C.W.L.	2,346	2,181·8
2	Frank Gould	Big Valley, Alta	B.R.	2,291	2,129·7
3	Hillcrest P. Farm	Salmon Arm, B.C	S.C.W.L.	1,921	1,996·2
4	Pioneer P. Farm	Agassiz, B.C	S.C.W.L.	1,872	1,967·8
5	Fred Senior	Box 712, Lethbridge, Alta	B.R.	1,956	1,923·8
6	H. A. Malcolm	Innisfail, Alta	S.C.W.L.	1,805	1,879·1
7	W. J. O'Neail	Innisfail, Alta	S.C.W.L.	1,827	1,874·1
8	W. W. Freeman	9,320—145th St., Edmonton, Alta	W.W.	1,790	1,870·6
9	G. Glasser	722—17th Street S., Lethbridge, Alta	B.R.	1,882	1,850·9
10	J. T. Whyte	724—19th Street N., Lethbridge, Alta	S.C.W.L.	1,635	1,824·6

Leading Birds

Bird No.	Owner	Address	Breed	Eggs	Points
64	Frank Gould	Big Valley, Alta	B.R.	254	287·9
284	J. T. Whyte	724—19th Street N., Lethbridge, Alta	S.C.W.L.	239	284·8
219	H. A. Malcolm	Innisfail, Alta	S.C.W.L.	223	265·7
311	Pioneer Poultry Farm	Agassiz, B.C	S.C.W.L.	244	262·2
286	J. T. Whyte	724—19th Street N., Lethbridge, Alta	S.C.W.L.	222	259·8
196	W. J. O'Neail	Innisfail, Alta	S.C.W.L.	225	256·9
218	H. A. Malcolm	Innisfail, Alta	S.C.W.L.	228	256·6
76	E. Brewitt	Michichi, Alta	B.R.	244	251·6
210	Cloverlea P. Farm	8820—111th Street, Edmonton, Alta	S.C.W.L.	204	251·1
205	Cloverlea P. Farm	8820—111th Street, Edmonton, Alta	S.C.W.L.	193	249·5

POULTRY REGISTRATION

Forty-two birds in the contest qualified for registration in the Canadian National Live Stock Records. To register, birds must be of a recognized breed, without standard disqualifications and must lay at least two hundred eggs in an official Contest. The eggs must average twenty-four ounces or more per dozen after the first month's lay.

HENS REGISTERED, 1928

Name and address of breeder	Breed	Number of birds	Average egg weights per doz.	Average eggs
			oz.	
A. Gurr, 1419—5th Ave. N., Lethbridge, Alta.	B.R.	1	24·0	233
Geo. Glasser, 722—17th St. S., Lethbridge, Alta.	B.R.	2	24·3	222
J. B. Penn, Hillcrest, Alta.	B.R.	1	24·9	208
Frank Gould, Big Valley, Alta.	B.R.	1	25·3	254
Ed. Brewitt, Michichi, Alta.	B.R.	1	24·1	244
Frank Edwards, 12833—73rd St., Edmonton, Alta.	B.R.	1	24·0	220
W. S. McAlpine, Creston, B.C.	B.R.	1	24·1	208
Fred Senior, Box 712, Lethbridge, Alta.	B.R.	3	24·7	216
W. J. Gould, Vegreville, Alta.	W.W.	1	25·8	215
W. W. Freeman, 9320—145th, Edmonton, Alta.	W.W.	1	24·8	215
G. E. Harp, Shouldice, Alta.	S.C.W.L.	4	24·5	230
W. J. O'Neail, Innisfail, Alta.	S.C.W.L.	2	24·8	214
Cloverlea Seed & Stock Farm, Edmonton, Alta.	S.C.W.L.	1	27·0	204
H. A. Malcolm, Innisfail, Alta.	S.C.W.L.	5	25·4	213
Barry F. Galbraith, Sangudo, Alta.	S.C.W.L.	1	25·0	211
M. Ridley, 1345 Redland Ave., Moose Jaw, Sask.	S.C.W.L.	1	25·0	231
Mrs. J. W. Cookson, Tofield, Alta.	S.C.W.L.	1	24·0	207
Hillcrest Poultry Farm, Salmon Arm, B.C.	S.C.W.L.	5	24·5	208
J. T. Whyte, 724-19th Street N., Lethbridge, Alta.	S.C.W.L.	4	25·6	218
Glen Brown, Big Valley, Alta.	S.C.W.L.	1	24·0	210
Pioneer Poultry Farm, Agassiz, B.C.	S.C.W.L.	3	24·2	230
Hodgson and Bushby, Box 66, Mission City, B.C.	S.C.W.L.	1	24·0	212

The following Alberta breeders own and are pedigree breeding registered hens under the supervision of a Dominion Inspector:

S.C. White Leghorns

Mrs. W. J. Bell, Baintree, Alta.
Glen Brown, Big Valley, Alta.
Mrs. J. W. Cookson, Tofield, Alta.
Cloverlea Stock Farm, 8820—111th St., Edmonton, Alta.
B. F. Galbraith, Sangudo, Alta.
G. E. Harp, Shouldice, Alta.
H. A. Malcolm, Innisfail, Alta.
E. R. Nicholls, 116—45th Ave., S.E., Calgary, Alta.
W. J. O'Neail, Innisfail, Alta.
Round T Ranch, High River, Alta.
J. T. White, 724—19th St., N., Lethbridge, Alta.

Rose Comb White Leghorns

Poplar Hill Poultry Farm, De Winton, Alta.
Round T Ranch, High River, Alta.

Barred Plymouth Rocks

E. Brewitt, Michichi, Alta.
Edward Downs, Bassano, Alta.
F. Edwards, 12833—73rd St., Edmonton, Alta.
Experimental Station, Lethbridge, Alta.
Geo. Glasser, 722—17th St., S., Lethbridge, Alta.
A. Gurr, Palace Meat Market, N. Lethbridge, Alta.
Frank Gould, Big Valley, Alta.
J. B. Penn, Hillcrest, Alta.
Fred Senior, Box 712, Lethbridge, Alta.
Geo. Wagar, Orion, Alta.

White Wyandottes

Experimental Station, Lacombe, Alta.
W. W. Freeman, 9320—145th St., Edmonton, Alta.
W. J. Gould, Vegreville, Alta.
R. S. Kerr, Coronation, Alta.
J. R. Moore, Vegreville, Alta.

Partridge Plymouth Rocks

Thos. G. Kinvig, 757—6th St., Medicine Hat, Alta.

BEES

The production of honey on a commercial scale has been successfully established in Southern Alberta, especially in the irrigated areas where sweet clover and alfalfa are extensively grown. Aside from the commercial enterprises, more farmers each year, both in the irrigated and the dry areas, are keeping one or more colonies of bees for the production of their home supply of honey. The general interest, therefore, in bee-keeping as a profitable side line for the farmer is increasing.

THE FALL AND WINTER OF 1927-1928

Unusually cold wet weather in the early fall of 1927 made the feeding and packing of bees, for the winter, very unsatisfactory. The winter began earlier than usual with cold weather and frequent snow storms. A light flight of bees was observed on October 28, and another did not occur till January 10. Liquid stores of honey were somewhat lacking as granulation apparently began early in the winter. This combination of circumstances, and unfavourable fall and a long hard winter when the bees had to depend to such a large extent on granulated stores, brought about heavy losses in this locality.

THE SEASON

The honey season of 1928 was a peculiar one in Southern Alberta. The changeable weather of fall and winter continued through April, and brood rearing was barely started by the last of the month. May was an ideal bee month and colonies grew strong rapidly. This particular month was remarkable for the high mean temperature that prevailed, and for the lack of storms. By May 5, willows, dandelions, wild prairie and early garden flowers were in bloom. The warm days with their long hours of sunshine created early sources of pollen and nectar, the supply of which encouraged brood rearing throughout the month. June, which is usually a strong month for honey production, disappointed the beekeeper by recording seventeen days of wet weather, and this condition caused considerable loafing and swarming. The first increase of weight by the colony on scales was made on June 24, or seventeen days later than in 1927.

July was cool and wet with thirteen rainy days in which the bees did not fly. August had a fairly good honey flow to its credit until the 14th of the month, when a very slight frost was experienced. No more increase in weights of the colonies on scales was recorded after this date although alfalfa, Red, White Dutch, Alsike, and sweet clover were all blooming, as was also gum weed, Canada thistle, fire weed and many garden and wild flowers. The two colonies on scales made an average gain of 202 pounds each for the season. Honey and supers were all removed by September 23, with feeding and packing well taken care of by October 23. Ninety-four colonies were fed and packed for the winter of 1928 and 1929.

EXPERIMENTAL PROJECTS

Thirty projects have been under way in the apiary for a number of seasons. Although none of these have been completed some facts concerning the more interesting ones are here presented.

METHODS OF PACKING FOR WINTERING

Three types of packing cases have been under test: one made large enough to hold four colonies placed snugly together, one to hold two colonies, and one to hold a single colony. In all of the cases about seven inches of planer shavings or sawdust were placed under the colonies, four inches around the sides and about twelve inches on the tops of the hives. The cases were fitted with waterproof covers and an entrance made through the planer shavings and sawdust from the hive openings to the outside so that the bees could fly at will on warm days. The results obtained for the past four winters from these three methods of packing are summarized herewith: Where twelve hives were packed and wintered in the four hive case, the average yearly loss was two dead colonies, and the average winter consumption of stores was 36 pounds. Where twelve hives were packed and wintered in the two hive case the average yearly loss was four dead colonies, and the average winter consumption of stores was 39 pounds. Where single cases were used the percentage of dead colonies in the spring was greater than where either of the previous methods were used, and the average consumption of winter stores was 44 pounds. The colonies that survived in the single cases were not as strong as in the other cases and the queens were inclined to be more sluggish and less satisfactory.

Another method of winter protection worthy of mention, because of its cheapness and convenience, is the wrapping of the hives with building paper. Colonies were left on their summer stands, being first wrapped with a layer of ordinary white or untarred building paper; the entire hive was wrapped, including the cover and the four sides, right down to the ground. After this layer was smoothly folded down a second or outer layer of tar paper was put on, and both layers of building paper were fastened and held in place by tacking pieces of lath around the hive stand close to the ground level. The bee escape was, of course, left open. This method of winter protection has been tested, in a limited way at the station for the past three years with results that compare favourably with those described above and is certainly promising, but further tests must be conducted before its general adoption could be recommended.

DIFFERENT STORES FOR WINTERING

A test is under way to determine the desirability of substituting sugar syrup for honey as the winter stores for the bees, and has been carried out as follows: One-third of the colonies in the test had all their honey removed and were fed enough sugar syrup to bring the colony weight up to seventy-five pounds; one-third of the colonies were left with a small amount of honey and fed up to the required weight with sugar syrup; the other one-third were given enough combs of alfalfa and sweet clover honey to bring them up to winter weight. Three years' results of this test indicate that it is not advisable to remove all the honey and provide only sugar syrup for winter stores. If the winter is mild so that bees have regular flights they seem to do well on all honey stores, but where the winter is severe, having some liquid sugar stores appears to be of decided advantage. The feeding of as much as twenty pounds of sugar syrup, which, of course, does not granulate and which the bees do not cap, is a good insurance against loss from granulated stores in an unfavourable winter.

WINTERING SURPLUS QUEENS

The need of some surplus, strong, vigorous, queens in the spring is appreciated by beekeepers in the district, especially those who are operating on a commercial scale. A very satisfactory way of arranging this is to utilize the small colonies that are in the apiary in September by combining two colonies in one brood chamber with a bee-tight division board between them, and providing a bee escape at one end of the hive for one colony and at the other end for the other. When the last thorough examination is made of

the apiary in September any colonies that have not more than five frames of brood are removed into these specially prepared hives and are supplied with a July or August hatched queen. Queens hatched in these months when the main honey flow is on, have proved to be more vigorous than those hatched in May or June and are consequently more desirable. These double colonies after being fed, are packed for the winter in single colony wintering cases. Four years' results where each fall, fourteen queens have been used in this way have given 91 per cent prolific queens alive in the spring. These double colonies have proved extremely valuable in the spring, not only in having queens to requeen colonies that had lost their queens during the winter or that proved to have drone laying queens, but the brood was of much value in strengthening weak colonies.

WINTERING BEES IN DOUBLE BROOD CHAMBER

The wintering of bees in double brood chamber has been tested out for three years by the following methods:—

A. Giving a deep super of fully capped combs of honey.

B. Giving a shallow super of fully capped combs of honey.

C. Giving a deep super of partly filled combs and 15 pounds of sugar syrup.

D. Giving a shallow super of partly filled combs and 15 pounds of sugar syrup.

The colonies wintered in single brood chambers as checks to be used for comparison were made into two groups, one group fed with fully capped combs of honey and one group fed with partly filled combs and 15 pounds of sugar syrup. Three colonies were used yearly in each group. Spring weather conditions in the first two years of this test were late and cool, while in the last year the season was earlier and warmer giving an earlier supply of pollen and nectar. There was no noticeable difference in the strength of colonies wintered in the double brood chambers when compared with those wintered in the single chambers at the first examination in the Spring, although the average winter loss of colonies was somewhat greater with the single brood chambers. The colonies wintered in double brood chambers consumed an average of 41·3 pounds of stores each, while those in the single brood chambers consumed but 31·0 pounds. The single brood chambers built up a little faster through the spring and summer and gathered a slightly larger honey crop. From the results obtained to date there does not appear to be any advantage in wintering bees in the double brood chamber, when compared with the ordinary single chamber method provided sufficient stores are supplied.

PACKAGE BEES FOR ESTABLISHING COLONIES

The bringing in of package bees from reliable breeders in the Southern States for establishing colonies of bees has been carried on at the Station for a number of years. A comparison of two pound packages and three pound packages has been made and from the data gathered it would appear that a two pound package contains enough bees to accommodate a prolific queen and hence there is not much difference in the time taken in the late spring to build up a strong colony from either the two pound or the three pound package. If a strong colony is built up by the time the main honey flow begins the two pound package will produce as much honey as the three pound package. The best time to receive the package bees would appear to be from about May 12 to May 27.

It was found that package bees received as late as June 15, although they developed into strong colonies well supplied with honey stores for the winter, were not able to produce any surplus honey.

BUILDING OF WEAK COLONIES IN THE SPRING

Most apiaries in the spring have some weak or small, queenless colonies and these must be built up for the honey harvest. Three methods for accomplishing this have been tried out for three and five years and the results are given below. The first method was adding to small colonies, having four or less frames of bees, a one pound package of bees. The second method was adding one frame of emerging brood with adhering bees shaken off. The third method was placing a weak colony, having but little brood, over a strong colony above a queen excluder and in about six weeks removing the strong colony to a new location.

BUILDING UP WEAK COLONIES IN THE SPRING

—	Year	Methods and dates of manipulation, weather, conditions of colonies and production: 1 pound package added	1 frame of brood added	Weak and strong colony united
Date of manipulation and weather conditions prevailing that day—	1924	.....	May 2; bright and warm.	May 2; Bright and warm.
	1925	.....	May 3; bright and warm.	May 10; bright and warm.
	1926	April 25; rain.....	April 26; rain.....	May 2; bright and warm.
	1927	April 28; cold and cloudy.	May 2; warm and windy	May 5; cloudy.
	1928	April 27; bright and warm.	May 1; bright and warm.	May 10; cool and cloudy.
		No.	No.	No.
Number of frames of bees per colony when treated.	1924	....	4·0	4·0
	1925	....	4·0	4·0
	1926	3·5	3·5	3·5
	1927	3·5	3·5	3·5
	1928	4·0	4·0	4·0
Number of frames of brood per colony when treated.	1924	....	1·0	1·0
	1925	....	1·0	1·0
	1926	2·0	2·0	2·0
	1927	1·5	1·5	1·5
	1928	2·0	1·5	1·5
		lb.	lb.	lb.
Extracted honey produced per colony.	1924	....	84·3	78·3
	1925	....	104·0	80·7
	1926	52·3	100·0	113·0
	1927	70·7	68·7	68·0
	1928	80·7	59·3	103·3
Average 3 years.....	.....	67·9	76·0	94·8
Average 5 years,.....	.....	....	83·3	88·7
Brood chamber, weight per colony after honey crop was removed.	1924	....	70·7	67·0
	1925	....	70·0	66·0
	1926	65·0	67·0	63·0
	1927	73·0	71·7	69·3
	1928	68·7	75·3	77·0
Average 3 years.....	.....	68·9	71·3	69·8
Average 5 years.....	.....	....	70·9	68·5

It will be noted from the table that the addition of a one pound package of bees gave the lowest results in production of honey. The average for the three years was 67·9 pounds as compared to 76 pounds where one frame of brood was added, and 94·8 pounds where the weak colony was united with a strong one for a period of six weeks. The last method certainly involves more manipulation than either of the others.

DETECTION OF SWARM PREPARATION

The process of going through a number of colonies of bees examining each brood comb to detect queen cells is very labourious and takes up a great deal of time in the busy season. Tests have been conducted to determine if preparation for swarming can be detected with reasonable certainty by the use of the double brood chamber, thus reducing the labour and time for examinations, as where a double brood chamber is used the queen cells are customarily built in the space separating the two chambers. As soon as colonies in 10 frame Langstroth hives showed signs of congestion in the spring, a shallow super of drawn comb was added to the regular brood chamber without a queen excluder. Every ten days at the regular examinations these shallow supers were tipped up from the back and any queen cells present along the lower edge of the combs were considered as swarm cells and the colonies treated accordingly. Care was taken not to overcrowd the supers. Three years' test showed that all queen cells built in the upper super, found by merely tipping the super, were swarm cells while those built on the combs in the lower chamber were supersedure cells. It would appear, therefore, from the results to date that, when a shallow super is used above the brood chamber without a queen excluder, the only examination necessary for practical purposes to determine whether the colony is making swarm preparation is to tip the super up and look for queen cells on the lower edges of the combs.

PREVENTION OF SWARMING

Fifteen colonies of as nearly equal strength as possible, with queens hatched the previous July, were selected and divided into three groups of five colonies each to study the effectiveness of various methods of giving room for the prevention of swarming. When colonies showed the least sign of congestion in the spring the first group was given a deep super of drawn combs without a queen excluder thus allowing the queen to use both compartments as a brood nest; the second group was given shallow supers of drawn comb without queen excluders and the third group was given deep supers of drawn comb with a queen excluder separating the upper and lower chambers. When congestion showed in the brood nest in the last group three combs of capped brood were raised above the queen excluder, and the brood nest was filled up with drawn combs. Two years' test showed that while the first method, i.e. adding a deep super without a queen excluder, was the most cumbersome and had swarm cells in both brood chambers, yet it yielded the most honey. The second method was next in honey production, was easiest to handle, and swarm cells were easily detected as they were invariably built on the bottom of the shallow combs. The third, where a queen excluder was used took the longest time to manipulate, was the least effective, gave the least honey, and the most swarming. It would appear that the greatest trouble with this last method was that it disorganized the brood nest. Spreading the combs to enable the empty combs to be added caused barriers and the formation of more swarm cells in most cases, although it worked satisfactorily in a few colonies. With this method the empty combs placed on the outside of brood nest were often filled with honey before the queen got a chance to lay in them. There is also the danger of an unnoticed larvae or egg, being raised above the queen excluder with a virgin hatching, pushing through the excluder, and going out to mate and then returning and causing trouble.

QUEEN REARING

Various methods of queen rearing have been carried on experimentally since 1924. The use of wooden cells, twenty or more on a regular frame, has been found the most practical where it is desired to rear queens in numbers. Where only a few queens are required a method that has been found quite satisfactory consists in placing, in the centre of the brood nest of a strong colony, a frame containing three triangular pieces of foundation fastened to the top bar with the point reaching down about two-thirds of the depth of the frame. As the bees draw the foundation out into combs the queen will occupy them with eggs. As soon as young larvae can be seen in the cells the frame of combs is removed, the bees brushed from them, and each triangular piece trimmed away at the lower edge up to the cells containing the larvae just hatched. The frame still containing the three pieces of comb is then placed in a strong colony that has been queenless for twelve hours. Five days later the combs are examined and all queen cells found built on the sides cut away leaving only those on the lower edges. These are allowed to be drawn out by the bees and on the tenth day from the day the combs were first given to the queenless colony the cells are cut off and transferred one each to queenless mating boxes to be accepted by the bees, the young queen then emerges, becomes mated and starts laying. This method has been tested out for the last three years and has been found very satisfactory when the number of queens required is limited.

Another method was worked out by placing a frame holding a full sheet of foundation in the centre of the brood nest of a selected queen mother. When this was drawn out into comb and filled with eggs the bees were carefully brushed off and every second and third row of cells lengthwise and crosswise on one side of the combs, was destroyed with a pointed stick. This left a number of cells containing eggs with an empty space around them. The frame, prepared side downward, was placed over the brood nest of a queenless colony, with one inch blocks of wood under each corner of the frame to allow the bees to draw out the queen cells. Ten days later these ripe, or ready to emerge, cells were cut from the comb and transferred, one each to hatching and mating boxes to be accepted, emerge, mate and begin laying.

July and August have proved more satisfactory than May and June for queen rearing and as the honey flow strengthened queen cells were accepted more readily and larger queen cells were accepted more readily and larger queens produced.

There are certain factors that materially affect queen rearing, and suitable weather conditions and honey flow are the essential factors. Bright warm weather is needed for the ready mating of queens, and an abundance of food or nectar is required to encourage the bees to draw out queen cells as desired. Mating boxes should always be well stocked with bees and food, and never allowed to be queenless for any length of time, or laying workers may be developed. Many queens are lost on their mating flight, and it would appear that virgins should be mated within a certain period after emerging, to procure the best queens. Cold, wet or stormy weather at the time when virgins should take the mating flight, therefore, causes them to be delayed in the hive and if this period is unduly prolonged, it will sometimes start them to lay unfertilized or drone eggs which are worthless. Careful notice is taken while the young queens are in the mating boxes of their brood combs to determine their prolificness and only those of good size that produce combs of well filled regular brood are used, and all small dark queens discarded.

Queens reared at the Station are giving good results and with the small amount of labour entailed, and the success with which they may be reared, it would seem quite feasible for Western beekeepers to raise their own queens. It has been found here that the home-reared queens are usually more satisfactory than those imported.

COMB HONEY PRODUCTION

Several years' data point to the fact that the production of comb honey alone in an apiary is not a success with the methods so far tried. A combination of comb extracted honey appears to be the most practical way of getting some comb honey, but even this is difficult. The greatest trouble is getting the bees to go readily into sections when a quick honey flow comes and persistent swarming is usually the outcome. Giving an over supply of sections in order that bees may be able to draw out sufficient cells to store new nectar for ripening does not appear to help. Bait sections of drawn-out comb do not seem to help much as the bees fill them quickly with honey and then loaf or swarm. During the past year, of three colonies that would not take to the sections, two were given one shallow extracting super each of foundation and the other left with only the supers of sections. The full combs of foundation were drawn out and filled with honey in twelve days, but the colony where sections were placed swarmed without working in them. To further test this the two supers of honey were removed and one colony was given sections with one drawn comb for bait and the other colony was given a super of foundation. The super of foundation was drawn out promptly and the bees were contented but in the other colony, when the bait comb was filled with honey, the bees would not start in the other sections but made preparation for swarming.

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