DOMINION OF CANADA

DEPARTMENT OF AGRICULTTRE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT

W. H. FAIRFIELD, M.S.

FOR THE YEAR 1925

Printed by Authority of the Hon. S. F. Tolmie, Minister of Agriculture, Ottawa, 1926

TABLE OF CONTENTS

DOMINION EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

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

THE SEASON

The season of 1925 began in a propitious manner in that March and April were unusually wet. The precipitation received was 4.25 inches while the average for the past 24 years has only been 1.69 inches for these two months. May was dry but the precipitation during June was good, amounting to 3.4 inches. During July the rainfall was again light, only 0.82 inches being recorded. The total precipitation, however, from the first of March to the end of July was just 0.17 inches more than the average amount received since meteorological records have been kept at Lethbridge. The first work on the land was some harrowing done on April 5. By the middle of the month work on the land was general throughout the district. Wheat harvesting began at least a week earlier than usual.

The most striking thing in connection with the season was the unprecedented wet spell of weather which continued throughout the months of September and October. From the 5th of September until the latter part of October, threshing was out of the question. In some localities threshing began in the latter part of October but it was not until the 13th of November that elevators began to accept grain on normal grades. Previous to that date all grain delivered was graded tough or wet. Fortunately the weather during November and December was dry and mild making it possible to complete threshing and other farm operations. Fall ploughing was continued in the district until December 18 although farmers were not able to do much of it owing to the delayed harvesting and threshing operations. The last cutting of alfalfa hay was practically lost. The little that was cut in good season in August was saved but any that was not in the stack by September 5 was of little account, for there was no haying weather from that date till the last few days in October. The last crop of alfalfa on several thousand acres in the district was never cut.

Probably the most serious affect of these untimely autumn rains and snow storms was in connection with the harvesting operations of the sugar beet growers. It was the first season that the new sugar beet factory at Raymond was in operation and many farmers unfamiliar with beet-growing were discouraged by the inconvenience they were put to, not to mention the actual loss that some of them sustained. That these weather conditions are unprecedented is fully sustained by official meteorological records that date back for a quarter of a century so that the beet-growers as a whole are not greatly dismayed over their unfortunate experience during the past fall.

METEOROLOGICAL RECORDS AT LETHBRIDGE, 1925

Month	Temperature F.			Bright sunshine	Wind			Evaporation from free water surface	Precipitation	
	Highest	Lowest	Mean		Hourly Mean	Greatest mileage in one hour			1925	Average 24 yrs.
	°	°	°	Hours	Miles	Miles	Direction	inches	inches	inches
January	50·0	−17·0	17·2	68·1	13·4	54	S.W.	.....	0·30	0·66
February	52·0	−17·0	19·8	107·1	10·5	51	S.W.	.....	0·99	0·65
March	64·5	−28·0	26·8	136·0	12·6	63	W.	.....	2·26	0·74
April	78·0	19·0	43·8	199·1	11·9	49	S.W.	.....	1·99	0·95
May	83·5	12·0	52·6	335·1	11·2	39	S.W.	3·71	0·43	2·46
June	92·0	33·0	59·8	279·7	9·7	27	W.	4·82	3·40	2·74
July	92·0	43·0	64·7	305·0	7·8	35	W.	7·02	0·82	1·84
August	90·5	38·0	61·5	318·0	9·7	31	S.W.	6·05	1·85	1·74
September	85·0	25·5	50·1	151·0	7·9	34	W.	3·44	4·86	1·64
October	66·0	−7·0	31·9	106·2	8·4	46	S.W.	1·09	1·08	0·86
November	56·0	7·0	33·8	118·0	13·5	38	S.W.	.....	0·16	0·59
December	61·0	−4·0	32·2	93·6	3·5	43	S.W.	.....	0·62	0·62
Average	72·5	8·6	41·2	184·7	10·8	43·0	.....	*26·13	*18·76	*15·49

Latest spring frost occurred on May 11 ..... 24·0°
First fall frost occurred on September 20 ..... 25·5°
Total precipitation for the four growing months of April, May, June and July ..... 6·64"
Twenty-four year average for the four growing months of April, May, June and July 7·99"

*Total.

A number of farmers in the district, as well as Illustration Station Operators over the province, are supplied with rain gauges and they have been good enough to report their observations of precipitation monthly to this office. The table that follows gives the locations and the names of the observers who have sent in complete returns for the twelve calendar months of 1925.

Station and Observer	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 1925
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Acadia Valley—E. C. Hallman	0·88	0·72	0·58	1·17	0·49	2·26	1·93	1·07	1·88	0·50	Nil	0·40	11·88
Barons—S. R. Hunt	0·60	0·90	2·36	1·63	0·43	3·26	1·72	1·09	3·68	1·93	0·35	0·60	17·20
Bow Island—M. Mortensen and R. H. Robertson	1·60	1·00	0·91	2·12	0·19	1·46	0·67	1·51	3·39	0·36	1·00	0·80	14·41
Bindloss—J. Barnes	0·15	0·05	0·40	2·10	0·21	2·68	2·52	1·33	2·60	0·54	0·20	0·40	13·18
Cardston—J. F. Parrish	0·70	0·55	2·54	2·36	0·78	1·98	1·29	2·36	4·43	2·37	1·20	0·10	20·66
Carmangay—W. R. Henderson	0·20	0·45	1·50	1·51	1·32	3·37	1·20	1·32	3·91	1·03	0·15	0·40	16·36
Claresholm—School of Agriculture	0·32	0·22	1·68	1·40	1·26	4·11	1·41	4·11	4·44	1·36	0·20	0·16	20·67
Coaldale—N. F. Priestly	0·38	0·63	1·90	1·96	0·21	3·06	0·82	1·34	4·10	0·97	0·75	0·60	16·72
Delacour—A. H. Fennessey	9·90	0·70	0·70	0·65	1·00	4·29	1·86	0·95	5·36	1·60	0·60	0·50	19·11
Empress (Sask.)—Wm. Rowles	0·40	0·20	0·91	3·22	0·53	2·33	1·42	0·92	1·71	0·39	0·20	0·20	12·43
Foremost—T. H. Frankish	0·70	0·50	0·55	2·52	0·24	2·18	0·65	2·58	2·40	0·38	Nil	0·50	13·20
Glenwoodville—Glen Wood	0·23	0·66	1·72	1·46	0·83	2·08	0·97	2·14	3·83	1·95	0·53	0·10	16·50
Grassy Lake—Jas. Palmer	0·80	0·60	1·03	2·72	0·33	2·78	0·33	2·32	3·53	0·79	0·05	0·90	16·18
Grassy Lake—J. E. James	0·50	0·90	0·18	2·14	0·29	2·35	0·40	1·96	3·00	0·39	Nil	0·70	12·81
High River—B. F. Kiser	0·50	0·40	1·40	Nil	0·65	2·84	1·80	1·59	4·86	1·05	Nil	0·40	15·49
Jenner—Clide Besse	0·33	0·32	1·03	1·94	0·38	1·78	2·68	0·48	2·42	1·35	0·18	0·60	13·49
Kippenville—D. Kippen	0·30	0·60	1·00	3·32	0·13	2·32	0·19	1·71	3·13	0·65	0·10	0·90	14·35
Kipp—C. M. Nicol	0·50	0·80	1·70	1·82	0·87	3·53	0·43	0·43	5·25	1·48	0·20	0·40	19·48
Lethbridge—Experimental Station	0·30	0·99	2·26	1·99	0·43	3·40	0·82	1·85	4·86	1·08	0·16	0·62	18·76
Lethbridge—R. E. Everest	0·33	0·97	2·58	2·06	0·78	3·56	0·81	2·83	5·12	1·55	0·18	0·45	21·22
Lucky Strike—L. C. Halmrast	0·30	0·50	1·22	2·75	0·16	1·24	0·42	1·36	3·00	0·60	Nil	0·60	12·15
Macleod—Norman Grier	0·60	0·50	2·40	1·21	1·01	3·12	1·54	3·13	4·10	1·66	0·70	0·40	20·37
Manyberries—J. F. Evenson	0·70	0·40	0·05	2·11	0·49	1·20	0·44	1·67	2·80	0·26	0·15	0·50	10·77
Munson—R. R. Fraser	0·30	0·65	1·83	1·59	0·55	3·03	3·63	0·78	2·50	0·56	0·23	0·65	16·30
Nobleford—E. L. Woodbury	0·42	0·68	2·20	1·58	0·97	5·96	1·22	2·53	3·47	1·55	0·15	0·46	21·19
Orion—Geo. Wagar	0·65	0·40	0·95	2·12	0·48	2·67	0·41	1·51	3·94	0·72	Trace	0·60	14·45
Pincher Creek—W. W. Henderson	0·77	0·75	2·70	1·05	0·47	2·31	1·08	2·32	5·22	3·25	0·40	0·20	20·52
Raymond—School of Agriculture	0·60	1·00	2·25	1·55	0·45	3·28	0·85	2·13	3·96	1·53	0·68	0·70	18·38
Sunnynook—R. Montgomery	0·50	1·30	0·47	2·22	0·31	1·81	4·10	0·05	2·76	0·31	Nil	0·70	14·53
Wainwright—G. C. Boyd	0·40	1·20	0·15	1·15	1·20	2·34	1·02	0·52	1·13	0·70	Nil	0·50	10·31
Whitla—R. H. Babe	0·50	0·60	0·70	2·95	0·70	2·57	1·45	1·53	3·33	0·80	Nil	0·40	15·53
Youngstown—G. S. Coad	1·00	0·70	1·00	2·25	0·20	2·55	2·92	0·42	1·16	0·48	0·25	0·65	13·58

ANIMAL HUSBANDRY[1]

CATTLE

STEER-FEEDING EXPERIMENT

Objects of the experiment:—

1. To compare alfalfa fed with full grain rations with alfalfa fed with one half grain ration.
2. To compare alfalfa and grain, with alfalfa, grain, and silage.
3. To compare corn silage with corn fodder.

Forty head of steers were purchased in the fall of 1924, on the Calgary market. These steers weighed about 1,000 pounds each, and cost 4.39 cents per pound. In this is included not only the buying price, but freight, loading of cars, feed in transit, dehorning, brand inspection and commission.

The steers were grouped as follows:—

Group 1. Alfalfa and full grain ration.
Group 2. Alfalfa, one-half grain ration.
Group 3. Alfalfa, one-half grain ration and corn silage.
Group 4. Alfalfa, one-half grain ration and corn fodder.

The feeding trial started on October 1, 1924, and was concluded on February 11, 1925—134 days in all. Each group consisted of ten head at the outset, but early in the experiment, one steer in group 1, died from bloat, leaving nine to complete the trial.

The quantity of grain fed to group 1, was double that fed to the other groups and consisted of four pounds per steer per day to start, and gradually increased to 12 pounds per day, which was all they would clean up, while groups 2, 3, and 4, were started at two pounds per day and gradually increased in such a manner as to give them just one half the amount fed to group 1. The grain mixture consisted of oats and barley, equal parts, at the beginning. Later on, the ration was modified to barley two-thirds, and oats one-third. Near the end of the trial, the grain ration consisted only of barley.

The steers were fed in the open, the only protection being a seven-foot board fence and a straw shelter, open to the south.

STATEMENT OF COSTS OF FEED AND GAINS DURING FEEDING PERIOD

—	Group 1 — Alfalfa and full grain ration	Group 2 — Alfalfa and half grain ration	Group 3 — Corn silage, alfalfa and half grain ration	Group 4 — Corn fodder alfalfa and half grain ration
Number of steers in group	9	10	10	10
Average initial cost per steer ... $	43·50	44·71	44·47	43·90
Average initial weight per steer (October 1924) ... lb.	992·8	1,013·0	1,012·0	1,000·0
Average final weight per steer, (February 1925) ... "	1,243·3	1,217·0	1,219·0	1,227·0
Average gain per steer, 134 days ... "	250·5	204·0	207·0	227·0
Average gain per steer per day ... "	1·87	1·52	1·54	1·69
Average cost of feed per steer for period ... $	37·02	25·98	26·76	23·81
Cost per pound gain ... cents	14·77	12·73	12·09	10·49
Number of steers valued at 6c ...	3	3	1	2
Total weight of steers valued at 6c ... lb.	3,540·0	3,390·0	1,090·0	2,280·0
Number of steers valued at 6½c ...	6	7	9	8
Total weight of steers valued at 6½c ... lb.	7,650·0	8,780·0	11,100·0	9,990·0
Average selling price ... $	78·85	77·41	78·69	78·62
Average cost of steer and feed ... $	80·60	70·45	71·19	67·71
Gain or loss per head ... $	−1·75	6·96	7·50	10·91

[1] Work with live stock is under the supervision of Arthur Newman.

QUANTITY AND VALUE OF FEED USED.—In computing the cost of feeding, alfalfa hay was charged for at the rate of $9 per ton; barley, 72 cents per bushel; oats, 51 cents per bushel; grinding charges, 10 cents per hundred. This increased the cost of the grain to 1.6 cents per pound, for both barley and oats. Corn silage was charged for at the nominal rate of $4 per ton, and corn fodder at $6 per ton.

—		Group 1	Group 2	Group 3	Group 4
Quantity of hay	lb.	36,773	36,850	25,190	27,420
Cost of hay	$	165·90	165·82	113·35	123·39
Quantity of grain	lb.	10,422	5,800	5,800	5,800
Cost of grain	$	116·75	92·80	92·80	92·80
Quantity of silage	lb.	.....	.....	30,360	.....
Cost of silage	$	.....	.....	60·72	.....
Quantity of corn fodder	lb.	.....	.....	.....	72·30
Cost of corn fodder	$	.....	.....	.....	21·69
Quantity of salt	lb.	62	78	49	87
Cost of salt	$	0·99	1·25	0·73	1·30
Total cost of feed per lot	$	333·21	259·87	267·60	239·18
Total cost of feed per steer	$	37·02	25·78	26·76	23·81

Following is a table setting out some of the findings of the experiment which help to show more clearly the reasons for the results as shown in the foregoing tables:—

Feed per lb. gain		Group 1	Group 2	Group 3	Group 4
Barley	lb.	2·312	1·423	1·400	1·277
Oats	"	2·312	1·423	1·400	1·277
Alfalfa hay	"	16·344	18·063	12·170	12·071
Corn silage	"	.....	.....	14·666	.....
Corn fodder	"	.....	.....	.....	3·185
Dry matter	"	19·03	19·591	17·429	15·971
Digestible nutrients	"	11·534	11·153	10·488	9·748
Nutritive ratio	—	1:4·5	1:4·25	1:5·5	1:5·0
Av. daily gain	lb.	1·87	1·52	1·54	1·69
Cost per lb. gain	cents	14·77	12·75	12·09	10·49
Profit or loss per steer	$	−1·75	6·96	7·50	10·91

It is evident from the foregoing table, that where a full ration of grain is fed, gains are made more rapidly, and also at a decided increase in cost. It is interesting to note that the 1.77 pounds grain, which was the difference in the grain requirements per pound gain, between group 1, on full grain ration, and group 2, on one-half grain ration, was balanced by an increase of 1.77 pounds alfalfa hay consumed per pound gain by group 2.

A study of the feed requirements of groups 3 and 4, will again reveal what has been repeatedly demonstrated in feeding trials at this Station, namely the economic importance of variety in the ration.

It might be mentioned, in this connection, that the average cost to produce a pound of gain during five feeding trials conducted at this Station over a period of five years where alfalfa was the only roughage was 14.24 cents; during the same period steers receiving corn silage in conjunction with alfalfa, produced gains at 12.90 cents per pound.

The results of a similar comparison between alfalfa alone, and alfalfa with corn fodder, covering an earlier period when feed values were different, show the

cost per poung gain, when alfalfa was the sole roughage, to be 15.94 cents, while when corn fodder was fed with alfalfa hay, feed cost per pound gain was 12.20 cents.

A comparison of corn fodder and corn silage would indicate that there is little, if any, advantage in feeding silage to steers where corn fodder can be easily cured, as is the case in this district. Corn fodder has shown a considerable margin of profit over silage in the 1924 and 1925 trial; over a period of several years, when both supplements had been used, there is very little difference in the amount of dry matter required per pound gain, and, as with the corn fodder, the expense of making silage is eliminated, consequently it makes a cheaper feed.

SUMMARY.—Results of rather extensive feeding trials at this Station indicate that alfalfa hay, when supplemented with roughages which tend to widen the nutritive ratio, and lend variety to the ration, such as corn fodder, corn silage, oat sheaves, sunflower silage, roots, and oat straw (cut) will produce cheaper gains than when alfalfa is fed as the sole roughage.

There is also sufficient evidence to support corn fodder, well matured, well cured, and not so coarse and fibrous as to be unpalatable, as the more economical supplement to alfalfa hay in the fattening ration.

After the close of the feeding trial, February 11, the steers were fed for forty days longer, or until March 24, when they were loaded for shipment to Halifax for export.

STATEMENT OF COST OF FEED AND GAINS FOR STEERS FOR ENTIRE FEEDING PERIOD FROM OCTOBER 1, 1924, TO MARCH 24, 1925

Hay, 23,353 pounds at $9. per ton	$	105 09
Grain, 12,630 pounds at 1·6c. per pound		202 08
Silage, 35,105 pounds at $4. per ton		70 21
Corn fodder, 1,090 pounds at $6. per ton		3 27
Salt, 89 pounds at 1·5c. per pound		1 25
Total cost of feed for forty days	$	381 90
Total gain in forty days—39 steers	lb.	3,349·6
Total average cost of feed per steer for 174 days	$	38 02
Average initial cost of steer per head		44 09
Total cost of steer	$	82 11
Average initial weight October 1st	lb.	1,004·4
Average final weight of export steers (34)	"	1,333·6
Gain in weight 174 days	"	329·2
Final average weight of culled steers (5)	"	1,160
Gain in weight per steer 174 days	"	156·0
Total weight of export steers	"	45,342·4
Appraised value at Lethbridge of export steers at $7.25	$	3,287 32
Total weight of culled steers	lb.	5,800
Selling price of culled steers (at $6.75)	$	391 50
Total value of steers (39)		3,678 82
Average value per steer		94 33
Average cost per steer		82 11
Profit per steer on Lethbridge appraised value		12 22

SHIPPING STORE CATTLE TO GREAT BRITAIN

Thirty-four of the steers described in the foregoing section were shipped from Lethbridge on March 24 en route to Halifax, where they were shipped together with other experimental lots from Experimental Farms on the prairie and in the Maritime Provinces, sailing on the ss. *Manchester Importer*, and were consigned to Chapman & Everett, Fakenham, Norfolk, England.

The Lethbridge group was a follow-up shipment of a similar lot which had been purchased on the Calgary market at the same time and at the same average price as those put on feed, but were shipped in October, the object being to determine the advantage in winter feeding on western farms as compared with exporting range stock off the grass in the autumn.

COST OF SHIPPING—LETHBRIDGE TO HALIFAX

Number of steers		34
Freight and other railroad charges from Lethbridge to Halifax	$	757 00
Attendants charges		34 00
Transportation charges, per head, at Halifax		23 27

SHRINKAGE EN ROUTE

Average weight Lethbridge, feed lot	lb.	1,333·6
Average weight at Moose Jaw		1,270·3
Per cent shrink to Moose Jaw		4·75
Average weight at Winnipeg	lb.	1,235·6
Percentage shrink to Winnipeg		7·35
Average weight at Montreal	lb.	1,220·6
Percentage shrink to Montreal		8·47
Average weight at Manchester	lb.	1,209·6
Per cent shrink to Manchester		9·14

EXPENSES IN CONNECTION WITH SHIPPING THIRTY-FOUR STEERS FROM FEED LOT TO GREAT BRITAIN VIA HALIFAX

Total charges, Lethbridge to Halifax	$	791 20
Tags and tagging, 5c. each		1 70
Ropes, roping and foreman's wages		30 20
Handling and loading		23 80
Insurance at $130 each at ¼ per cent		27 63
Ocean feed		190 60
Cattlemen's supplies, board, etc		8 30
Excise stamps		0 40
Ocean freight		680 00
Total	$	1,753 83
Less demurrage (one day at Halifax)	$	17 00
Total cost to port of debarkation		1,736 83
Average cost per head to port of debarkation		51 08
Overseas charges at 17/6 each at $4.80 to the £		142 80
Total charges		1,879 63
Total returns, exchange at $4.80		4,845 60
Net return		2,965 97
Gross return for 100 lb. at Manchester		11 68
Net return per 100 lb. at Manchester		7 15
Net return per 100 lb. at Farm or Station (3% shrink allowance)		6 75
Net profit per steer		4 90

REMARKS REGARDING STEERS.—The shipment was made up of sixteen blacks and eighteen reds, and was grouped in this way for sale. The sixteen blacks were a very uniform group, showing breediness and good even fleshing. They sold for an average of £30 9s. 9d. each; nine of the best for grazing at £32 each, and several smaller ones for slaughter at £28 10s. each. The eighteen reds were not so breedy or uniform and were sold for slaughter at £29 each. Of these, Messrs. Chapman & Everett have the following to say: "A good well-bred black will always realize top price here for either keeping purposes or for slaughter. The reds were sold to a Manchester butcher, being just the size (average weight 1,200 pounds) and condition suitable for Manchester requirements."

FALL VS. SUCCEEDING SPRING SHIPMENT OF SIMILAR CATTLE PURCHASED AT THE SAME TIME

Forty steers, similar to those carried on feeding trial and shipped in March, were shipped in October, shortly after being purchased on the Calgary stockyards. The following table gives the comparative results of range cattle exported in October and winter fed and exported in the spring:—

PROFIT AND LOSS STATEMENT ON OCTOBER 1924 VS. APRIL 1925 SHIPMENT OF STEERS FROM LETHBRIDGE

	Oct. 1924	April 1925
Date of shipment		
Number of steers	40	34
Original cost of steers	$ 1,772 68	$ 1,506 78
Cost of feed to carry over winter		1,292 68
Cost of transportation to and selling charges in Great Britain	1,761 68	1,879 63
Total cost	3,534 36	4,679 09
Total return	3,842 00	4,679 09
Total profit per lot	307 64	166 51
Total profit per steer	7 69	4 90
Adjustments:		
Rebate on freight due to extra haul to Halifax of $6.62 per steer		225 08
Rebate on exchange, difference between £ at $4.52 in Oct., 1924, and $4.80 in April 1925	182 84	.....
Adjusted total profit	490 48	391 59
Adjusted total profit per steer	12 26	11 52
Gross return per steer at Manchester all figured at $4.80 to £	102 00	142 50
Gross return per 100 lb. at Manchester	10 57	11 68
Spread in price per 100 lb. in favour of winter feeding and early spring shipment		1 11

THE DAIRY HERD

In June, 1925, the first dairy cattle were received from the Holstein herd, Central Experimental Farm, Ottawa, and consisted of three mature cows, one two-year-old heifer, two yearling heifers, and two heifer calves, also a seven-month-old bull. A few weeks later this herd of nine head was supplemented by a shipment of eight head from the Holstein herd at the Experimental Station at Lacombe, consisting of three mature cows, two two-year-old heifers, two yearlings, and one heifer calf, making in all a herd numbering seventeen head of pure-bred Holsteins, all from accredited herds.

Two of the two-year-old heifers gave such strongly positive reactions to the blood serum test for abortion bacillus that they were considered spreaders, and were removed to the Veterinary Research Station for further observation by the Health of Animals Branch.

Counting the increase, or calves, the entire dairy herd numbered twenty-two head on December 31, 1924. Eight of the milk cows are on experimental feeding test, the object of which is to determine the economy of milk production when a strictly home-grown ration is fed as compared with a ration supplemented by purchased concentrates high in protein.

SHEEP

LAMB FEEDING EXPERIMENT

The object of the experiment was to ascertain, if possible, the most profitable quantity of grain to feed with alfalfa hay as the main roughage, as well as in combination with certain other roughage, in finishing lambs.

Two hundred lambs were divided into four groups of fifty each and fed as follows:—

Group 1.—Alfalfa hay and full ration of grain.
Group 2.—Alfalfa hay and half ration of grain.
Group 3.—Alfalfa hay, corn silage and half ration of grain.
Group 4.—Alfalfa hay, green oat sheaves and half ration of grain.

Care was taken to have the fifty lambs in each group as similar as possible, both as to type and size. The feeding was carried on in the open, the only shelter provided being an open shed on the west side of each corral.

The lambs were started on a small daily ration of grain but in the case of the first group, the ration was increased as rapidly as possible until the lambs were given all they would clean up. Within three weeks, they were consuming nearly two pounds a day, but they never ate over two pounds. The quantity of grain it was possible to get group 1 to consume was considered a full ration,

and the other three groups were given one-half of this quantity. The grain was composed of mixed barley and oats and it was not ground, but fed whole. During the first seventeen days of the experiment, the mixture was made up of one-half oats and one-half barley. During the balance of the time, the mixture contained one-third oats and two-thirds barley.

In a feeding test of this kind, the rapidity with which a finish is obtained is as important, if not even more important, than the actual gain in weight.

The experiment was begun November 3, 1924, and by January 30, 1925, more than half the lambs on test had reached a high degree of finish. On this date a sale was made of the finished lambs.

The following table gives the number of lambs the buyer selected as fully finished at that time out of the fifty in each group.

—	Group 1 — Full grain and hay	Group 2 — ½ grain and hay	Group 3 — ½ grain corn silage and hay	Group 4 — ½ grain oat sheaves and hay
Number of lambs finished in 89 days	45	28	33	25
Percent of lambs finished in 89 days	90	56	66	50
Average weight per head of finished lambs lb.	108·8	97·1	99·7	100·4
Average weight per head of cutbacks (on January 30) lb.	94·0	90·9	92·3	90·4
Average weight per head of cutbacks on March 6, after 35 days further feeding lb.	110·0	111·4	112·3	108·8

These 131 head were sold on January 30 to Delaney & Co., Lethbridge, Alberta, the price being $15 per hundred. The remaining sixty-nine head were thrown into one group and were fed until March 6.

The following table gives the results of the feeding test up to January 30, when the selection of the finished lambs was made from the various groups.

LAMB-FEEDING EXPERIMENT

—	Group 1 — Hay, full grain	Group 2 — Hay, ½ grain	Group 3 — Corn silage, hay, ½ grain	Group 4 — Oat sheaves (green), hay ½ grain
Number of days in experiment	88	88	88	88
Number of lambs in group at beginning	50	50	50	50
Number of lambs in group at end	50	50	50	50
Total initial weight lb.	3,580	3,500	3,670	3,640
Average initial weight "	71·6	70	73·4	72·8
Total final weight "	5,370	4,720	4,860	4,770
Average final weight "	107·4	94·4	97·2	95·4
Total gain for period "	1,790	1,220	1,190	1,130
Average gain per head "	35·8	24·4	23·8	22·6
Average gain per head per day "	·41	·28	·27	·26
Quantity of silage fed for period	.....	.....	3,385	.....
Quantity of oat sheaves fed for period lb.	.....	.....	.....	3,545
Quantity of alfalfa hay fed for period "	9,250	11,420	11,230	7,810
Quantity of oats fed for period "	1,544	772	772	772
Quantity of barley fed for period "	5,250	2,625	2,625	2,625
Quantity of salt fed for period "	85	85	85	85
Cost of Feeds and Returns				
Total cost of feed $	145·41	103·89	119·84	103·6
Cost of feed per head $	2·89	2·08	2·33	2·07
Cost of feed per head per day c.	3·0	2·0	2·6	2·3
Cost to produce one pound of gain "	8·1	8·5	9·8	9·2

In the preceding table, the prices at which the feeds were charged are: Alfalfa hay, $9. per ton; green oat sheaves, $9. per ton; ensilage, $4. per ton; 72 cents per bushel; oats, 51 cents per bushel.

The sixty-nine head fed together from January 30 to March 6, consumed 5,920 pounds of alfalfa and 9,660 pounds of mixed barley and oats composed of two-thirds of the former and one-third of the latter. The respective average weights of these are given in the first table.

PASTURING SHEEP IN FOREST RESERVE

The objects of the experiment were to determine the feasibility of alfalfa-growers on irrigated land utilizing the nearby Forest Reserve in the Rocky mountains for summer pasture 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 the sheep from the farms in the Lethbridge district to the mountain ranges, one feature of the experiment as planned was to ship the sheep by rail to and from the summer range. This has now been carried out for six seasons and the results indicate that the plan is both practical and profitable.

In the fall of 1919 a grade band of 800 Merino ewes was provided, which, with the small flock of ewes on the Station at that time, brought the total number to 900 head. It was necessary to have at least this number to make it possible to operate profitably under range conditions. That is to say, the cost of the herder would be the same for a small band as for a fair-sized band, and if the band were too small the cost per head would be excessive.

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 Coleman and returned by rail again in the fall. The ewes are bred to lamb fairly early, that is, from the middle of March to the latter part of April. 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 the latter part of May. After shearing they are dipped and branded, these operations being completed in time to allow the sheep to be shipped to the mountains during the first week in June. The sheep have been returned to Lethbridge either the last week in September or during the first week in October. October, 1925, completed the sixth year of the experiment, and the statement that follows gives the details of the expenses and returns during the period from October, 1924, to October, 1925, and shows that a gross profit of $7,002.97 was made during that time.

PASTURING SHEEP ON FOREST RESERVE

Expenses October 1924 to October 1925—		
Winter pasture on stubble fields	$	609 22
Alfalfa hay, 148·5 tons at $9.50 per ton		1,410 75
Low grade Alfalfa hay, 27 tons at $5. per ton		135 00
Oat hay, 2 tons at $10. per ton		20 00
Silage, 89 tons at $4. per ton		356 00
Grain, oats and barley mixed, 37,900 lb. at $30. per ton		568 50
Salt, 2·3 tons at $30. per ton		69 00
Summer pasture on Forest Reserve		81 00
Total freight to and from Forest Reserve		658 08
Shearing		148 40
Purchase of bucks		210 00
Labour—total for 12 months		1,930 00
	$	6,222 95

PASTURING SHEEP ON FOREST RESERVE—*Concluded*

Inventory, October 1924:—		
Number of ewes to be bred, 905 at $12		$ 10,860 00
Number of ewe lambs on hand, 113 at $8.75		988 75
Number of feeder lambs on hand, 295 at $7.75		2,286 25
Number of bucks on hand, 19 at $20		380 00
		$ 14,515 00
Sales:—		
120 aged ewes—net receipts		$ 1,082 60
809 lambs—net receipts		9,635 83
10 bucks		74 30
Net Wool receipts, less dip and supplies		2,233 19
		$ 13,035 92
Inventory, October 1925:—		
Number of ewes to be bred, 830 at $13		$ 10,790 00
Number of ewe lambs on hand, 200 at $9		1,800 00
Number of feeder lambs on hand, 205 at $8		1,640 00
Number of bucks on hand, 19 at $25		475 00
		$ 14,705 00
Financial Summary:—		
Sales for year	$ 13,035 92	
Inventory, October 1925	14,705 00	
Expenses for year		$ 6,222 95
Inventory, October 1924		14,515 00
Gross profit		7,002 97
	$ 27,740 92	$ 27,740 92

DETAILS OF TEST FROM OCTOBER 1924 TO OCTOBER 1925.—The sheep reached Lethbridge from the Forest Reserve on October 3, 1924, and were put on stubble fields. The lambs were disposed of, except the 295 feeders and the 113 head of ewe lambs saved for the maintenance of the breeding flock. These ewe lambs were run with the ewe band except during the breeding season. The band was carried on stubble fields in the neighbourhood rented for the purpose until March 9. Hay was fed only 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. The sheep were returned to the Station on March 9 and began to lamb in a week's time. Of the 905 ewes bred there were 72 that failed to have lambs but nevertheless there were 987 lambs on hand when the band was shipped to the mountain range in June, which is a very satisfactory percentage of lambs to save from a band of this size. Shearing was begun on May 5 and finished May 9. The sheep were all dipped, lambs included, on May 19, and on May 27 were branded.

On June 6, 1925, the sheep were shipped to the Forest Reserve at Coleman, Alberta. There were included in the shipment 988 ewes and 987 lambs. The first material loss in shipment to the mountains during the six seasons that the experiment has been carried on has to be recorded this year. On one deck there were three ewes and fifteen lambs dead. The first night after unloading there were three ewes lost from poison weeds. These casualties added to the number lost during the summer made our losses rather high. The total losses between the time the sheep were shipped up and shipped back were 29 ewes and 52 lambs. Expressed in percentage the loss in mature sheep was 2.93 per cent; lambs, 5.27 per cent; or on the entire band, 4.1 per cent.

For the past five years the results of each season's experiments have been given in detail in the annual reports, copies of which may be had on application; these included an itemized financial statement of shearing expenses and returns. A summary of these is here presented.

FINANCIAL SUMMARY COVERING PERIOD FROM OCTOBER, 1919, TO OCTOBER, 1925

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 62	
Inventory, October, 1922	9,839 25	
Expenses for year		$ 4,722 88
Inventory, October, 1921		7,898 00
Profit		1,466 99
	$ 14,087,87	$ 14,087 87

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

Five years' Results

Total sales	$ 46,295 01	
Increase, Inventory, October, 1925 over Inventory, 1919	$ 4,655 01	
Total expenses		$ 33,062 27
Total gross profit		17,887 74
	$ 50,950 01	$ 50,950 01

The crux of the whole experiment hinges on the cost of transportation to and from the summer range. The actual cost of the pasture itself is nominal. The Forestry Branch make a charge of eight cents per head for the season covering the period from June 1, to September 30.

This is based on the number of mature sheep, the followers, that is the lambs, are not counted. Computing the cost of transportation, on the per head basis of mature sheep, not counting the lambs, for the last five years, we have the following figures:—

Season of 1925—69.4 cents per head; season of 1924—62.8 cents; season of 1923—62.7 cents; season of 1922—53 cents; season of 1921—66.5 cents, or an average, over the five years of 62.9 cents.

The reason for the variation in cost of transportation for the different years is that the number of lambs in proportion to the mature sheep varied in the different years. At the prevailing prices for mutton and wool, the experiment clearly indicates that sheep on irrigated farms in the district may be handled in this way with profit.

SWINE

On December 31, 1925, the swine herd numbered thirty-nine head, and consisted of eleven Yorkshire brood sows; one Yorkshire boar; one Tamworth boar and twenty-six feeders. During the year the farm herd had been improved by the purchase of eight pure-bred Yorkshire sows and the above mentioned boars. Sales of pork have amounted to 17,270 pounds and five head have been sold as breeding stock.

In former years the one-litter-per-year system has been followed, the sows being wintered in open lots with a cabin for sleeping-quarters. This year there were three litters in November which will allow some work to be done on fall litters. For this purpose a straw shed has been erected.

FEEDING EXPERIMENT

During the summer of 1925 an experiment was carried on with forty-eight of the May-farrowed pigs, with the object of determining the effect of various supplements to the grain ration on the cost of production and on the quality of pork produced, as determined by government grades alive and by grading of the dressed carcasses on the rail by bacon experts.

The hogs in the experiment were all from sows of the same Yorkshire strain, and all from the same sire. Consequently in breeding they were fairly uniform. They were weaned on July 9, and started on feeding trial on July 12. Individual weighings were taken and the average of three daily weighings was taken as the initial weight. Individual weighings were taken at frequent intervals throughout the test in order to check up on the progress of each individual.

The test covered a period of 144 days in all, which has been divided into three periods in order to facilitate the interpretation of results.

The feeds used during the various periods are indicated in the plan of experiment. It will be noticed that the pasture finished at the end of the first period. This was in part due to the early snow, and general cold weather about that time. While the pigs were still allowed access to the pasture lot, there was little or no feed available from that source.

Each group was fed all the grain mixture they would clean up readily and an endeavour was made to have water before them at all times.

PLAN OF EXPERIMENT

Lot Number	Number of hogs	Days on trial	Grain ration fed	Supplementary feeds
			Period 1	
1	12	59	Oats ⅔, shorts ⅓	
2	12	59	" "	Alfalfa pasture.
3	12	59	" "	Alfalfa pasture, buttermilk, 1 gal. per day.
4	12	59	" "	Alfalfa pasture, tankage 10%.
			Period 2	
1	12	51	Oats, shorts and barley, equal parts	
2	12	51	" " "	Alfalfa pasture finished.
3	12	51	" " "	Buttermilk.
4	12	51	" " "	Tankage 6%.
			Period 3	
1	11	33	Oats, shorts and barley, equal parts	Tankage 6%.
2	10	33	" " "	
3	3	33	" " "	Buttermilk, 1 gal. per day.
4	9	33	" " "	Tankage 6%.

TABLE FOR PERIOD I, JULY 12 TO SEPTEMBER 8

——	Group 1 Grain alone	Group 2 Grain, alfalfa pasture	Group 3 Grain, alfalfa pasture, buttermilk	Group 4 Grain, alfalfa pasture, tankage
Number of days in period	59	59	59	59
Number of hogs in experiment	12	12	12	12
Average initial weight.....lb.	45·7	48·3	47·6	44·7
Average final weight..... "	93·7	112·0	132·9	114·2
Average gain for period..... "	48·0	63·7	85·2	69·5
Average gain per head per day..... "	0·81	1·08	1·44	1·17
Pounds grain per head per period..... "	215·8	228·3	198·0	200·0
Pounds grain per head per day..... "	3·65	3·86	3·35	3·38
Pounds grain to produce one pound gain..... "	4·5	3·6	2·3	2·9

Examination of the preceding table will reveal that group 1, fed a straight grain ration, not only made the lowest gains but also required a larger amount of grain to produce a pound of gain.

Group 2, on grain and alfalfa pasture, made a total gain of 764 pounds. This was 189 pounds more gain than was produced by group 1. In addition this increased gain was made on 90 pounds less grain per 100 pounds gain than was consumed by group 1.

Group No. 3 on grain, alfalfa pasture and buttermilk made a total gain of 1,022 pounds. This was 476 pounds more gain than group 1 and 258 pounds more gain than group 2. In this case the increased gain was made on 220 pounds less grain per 100 pounds gain than was consumed by group 1, and on 130 pounds less grain per 100 pounds gain than was consumed by group 2.

Group 4, on grain, 10 per cent tankage and alfalfa pasture, made a total gain of 834 pounds. This was 258 pounds more gain than group 1, 70 pounds more gain than group 2, and 188 pounds less gain than group 3. In this case the increased gain was made on 160 pounds less grain per 100 pounds gain than was consumed by group 1, and 70 pounds less grain per 100 pounds gain than was consumed by group 2. As compared to group 3, 10 per cent of tankage in the grain proved inferior to 10 pounds of buttermilk per day, the tankage-fed lot requiring an average of 60 pounds pure grain per 100 pounds gain produced.

DEDUCTION FROM PERIOD I.—1. A grain ration of oats 2/3 parts and shorts 1/3 part does not provide for maximum growth in young pigs.

2. The deficiencies of a straight grain ration are in part supplied by alfalfa pasture.

3. Buttermilk and tankage have a beneficial effect on the rapidity and economy of gains in young pigs, the buttermilk being superior to tankage in this regard.

TABLE FOR PERIOD II, SEPTEMBER 8 TO OCTOBER 28

——	Group 1	Group 2	Group 3	Group 4
Number of days in period	50	50	50	50
Number of hogs at beginning of trial	12	12	12	12
Number of hogs at end of trial	11	10	3	9
Average initial weight.....lb.	93·7	112·0	132·9	114·2
Average final weight..... "	145·1	172·1	194·2	182·9
Average gain per period..... "	51·4	60·2	61·3	68·7
Average gain per head per day..... "	1·03	1·2	1·2	1·37
Pound grain per head per period	285·0	280·0	266·6	290·0
Pounds grain per head per day	5·7	5·6	5·3	5·8
Pounds buttermilk per period	.....	.....	5,280·0	.....
Pounds tankage per period	.....	.....	.....	216·0
Pounds grain per pound gain	5·55	4·7	4·4	4·2

NOTE.—Fifteen of the hogs had reached market weights shortly before the end of the second feeding period and were shipped out and graded. This, however, will not effect the figures, in this table materially as they are based on grain consumed.

As is shown by the foregoing table the number of pounds of grain required to produce a pound of gain has greatly increased in all cases over that required in period I. This is no doubt due in part to the very inclement weather condition prevailing throughout the period, but more particularly to the increased feed requirements of the pigs as they increased in size and age.

Group 1 possibly suffered more from the weather than did the others due to the smallness of their paddock which got very muddy.

It is worthy of note that group 2, although the amount of pasture available was practically nil, still make gains much more cheaply than in the case of group 1, where no pasture was used. This may have been due to the continued effect of the pasture used in the first period.

Group 3, while not maintaining as large a margin over group 2, in economy of gains was still leading. However, it is doubtful if the use of buttermilk was profitable during the period from the standpoint of reduction in grain requirements only. However, the earlier maturity of the group, and the better grade obtained, is an important consideration.

DEDUCTIONS FROM PERIOD II.—1. Inclement weather conditions uncomfortable quarters, and a ration lacking the nutrients present when alfalfa pasture was available, appreciably increased the cost of pork production.

2. Alfalfa pasture apparently has an advantageous stimulating effect on hogs which continues after the pasture is no longer available.

3. Buttermilk apparently is used more efficiently when fed to younger pigs.

TABLE FOR PERIOD III, OCTOBER 29 TO DECEMBER 2

——	Group 1	Group 2	Group 3	Group 4
Number of days in period	35	35	35	35
Number of hogs in experiment	11	10	3	9
Average initial weight.....lb.	142·0	168·6	172·3	174·9
Average final weight..... "	185·5	199·3	229·0	218·5
Average gain per period..... "	43·4	31·0	56·6	43·6
Average gain per head per day..... "	1·24	0·88	1·6	1·25
Average pounds of grain fed hog per period	255·8	349·5	574·3	373·3
Average pounds of grain fed hog per period	7·3	9·98	16·4	10·6
Pounds buttermilk consumed	.....	.....	1,050	.....
Pounds tankage consumed	159	.....	.....	186
Pounds grain per pound gain	5·8	11·27	10·1	8·6

The experiment was altered slightly in the third period. Group 1, which had previously been fed on grain only, was now given 6 per cent of tankage added to a grain mixture composed of equal parts oats, barley and shorts. At this period the pigs of group 1 were small, decidedly discontented, and were continually rooting in the small paddock allotted them.

The tankage seemed to add something to the ration which had been lacking formerly as they immediately became more contented, appeared more thrifty and made an average gain of 1.24 pounds per day as compared with their daily gain of 0.86 pounds in period 2, and with group 2 in period 3, which is now a straight grain group, where a daily gain of only 0.88 pounds was produced and that at an increased feed requirement of over 100 per cent.

Group 2, as is indicated above, made rather unsatisfactory progress during the period. Apparently they had lost the reserves of stimulating food elements stored while on luxuriant alfalfa pasture and which apparenty carried them over period 2 in good condition. Therefore, possibly they were suffering from a deficiency of vitamine A or lime, both of which are plentiful in alfalfa.

Group 3, during this period, appears to bear out the finding of period 2, in that buttermilk, while its use produced a cheap gain in the first feeding period, does not have the same effect on gain, in older hogs.

Group 4, while not making gains with as low a grain requirement as No. 1 during the third period, was well below groups 2 and 3. Group 4 in this respect is the reverse of group 3, where buttermilk was fed, in that while the effect of tankage was low in the younger pigs, its efficiency increased as the feeding period advanced.

DEDUCTIONS FROM PERIOD III.—1. Tankage added to grain ration appears to supply a nutritive deficiency and cause more rapid and cheaper gains.

2. The continuing stimulating effect of alfalfa pasture apparently cannot be relied upon for long after the pasture crop is discontinued.

3. Buttermilk has a greater efficiency from the standpoint of gains when fed to younger pigs than when fed to pigs in the finishing stage.

4. Tankage in this test proved to be a more efficient feed for finishing hogs than for hogs in the younger stages of growth, contrary to generally accepted belief.

GRADING.—The hogs in these feeding trials were followed to the market. The identity of each individual was kept through the live grading and through the slaughtering, individual weights being secured of the carcasses, dressed for Wiltshire sides (head removed). They were also graded as dressed carcasses into shops, thick smooth, and Wiltshires. On the thirty-three hogs in the last shipment it was possible also to secure an individual report on length of side, and also a firmness report after chilling. The report on the length and firmness after chilling is not available for the fifteen hogs shipped in October.

GRADES ALIVE AND ON RAIL

——	Group 1	Group 2	Group 3	Group 4
Total weight in feed lot (live).....lb.	2,219	2,375	2,489	2,588
Total weight on rail (dressed)..... "	1,469	1,548	1,601	1,709
Average weight in feed lot (live)..... "	185·4	198·0	207·4	215·6
Average weight on rail (dressed)..... "	122·4	129·0	133·4	142·4
Average dressing per cent based on feed lot weights...	66·1	65·1	64·3	66·0
Percentage graded as shop (live).....	8·3	8·3	0	0
Percentage graded thick smooth (live).....	75·0	58·3	41·7	66·66
Percentage graded selects (live).....	16·6	33·33	58·3	33·33
Percentage graded shop (dressed on rail).....	8·3	8·3	0	0
Percentage graded thick smooth (dressed on rail)....	75·0	58·3	33·3	33·3
Percentage graded Wiltshire (dressed on rail).....	16·6	33·33	66·6	66·66
Average length of side (dressed on rail) inches.....	28·3	28·8	31·0	30·0
Firmness after chilling (33 hogs)—				
Slightly soft.....	4	8	2	8
Medium soft.....	2	2	0	1
Very soft.....	5	0	1	0

As is indicated by the firmness report, none of the bacon produced in the foregoing trials was of the highest quality; the reason for this is a matter for future experimentation.

The report of the carcass grading was made possible through the courtesy of the management of the P. Burns abattoir, and the officers of the Dominion Live Stock Branch at Calgary.

FIELD HUSBANDRY

TWO FARMS

Two distinct types of farming are carried on in southern Alberta, irrigation farming and dry farming (farming without irrigation). These two types have distinct problems, often as different as those found in widely separated parts of the country. To meet this condition the Experimental Station at Lethbridge was located where one-half of the farm could be irrigated and the other half operated as a dry farm. This arrangement really makes two farms operated under one management, so in reporting the field investigations the dry land and irrigated land are reported separately.

CULTURAL EXPERIMENTS ON DRY LAND

Experiments to determine the best cultural methods to follow on the dry land have been conducted every year since the Station was established. The investigations conducted on the dry farm at the present time are divided into three groups: first, the culture of summer-fallowed land; second, the culture of stubble land; and third, the value of different summer-fallow substitutes.

The season promised well for dry-land wheat production having nearly double the precipitation of the previous season in the winter period, September 1 to April 30, but the early promise was dissipated by subsequent drought conditions, very similar to 1924, resulting in another excellent year for demonstrating the relative utility of dry land cultural methods.

Because wheat yields are directly proportional to moisture supply which may be profoundly influenced by cultural treatment, and to show the similarity of the growing season precipitation of the last two years, the rainfall records of the two seasons are noted:—

WINTER PRECIPITATION

	1923-24	1924-25
	inches	inches
September 1-April 30	5·12	10·15
May	1·17	0·43
June	3·82	3·40
July	0·54	0·82
August	2·91	1·85
	13·56	16·65

No hail was recorded in 1925, so cultural treatment was the main factor affecting yield.

[1] Work in irrigation, as well as with the bees and poultry, is under the supervision of Mr. A. E. Palmer.

The following lists show the yield on the various plots for the year 1925:—

YIELD SUMMARY, STUBBLE TREATMENT

—	Yield per acre		
	Plot	Duplicate	Average
	Bush.	Bush.	Bush.
Fall plough 3 to 4 inches	11·8	15·2	15·55
Spring plough 3 to 4 inches	13·2	16·0	14·60
Fall plough 6 inches	11·9	12·4	12·15
Fall plough 6 inches and pack	11·3	8·7	10·00
Spring plough 6 inches	17·0	16·3	16·55
Manure before spring plough 6 inches	16·9	17·3	17·10
Spring plough 6 inches and pack	17·8	16·7	17·25
Stubble disk at harvest, fall plough	12·1	11·4	11·75
Stubble disk at harvest, spring plough	14·0	12·1	13·05
Disk stubble in spring	12·0	9·2	10·60
Burn stubble in spring and plough	20·0	16·5	18·25
Burn stubble in spring and disk	21·3	12·7	17·00

YIELD SUMMARY, WHEAT FOLLOWING SUMMER-FALLOW SUBSTITUTES

—	Yield per acre of wheat		
	Plot	Duplicate	Average
	Bush.	Bush.	Bush.
Potatoes	15·9	15·2	15·55
Corn	16·9	15·7	16·30
Corn (manured)	15·6	15·3	15·45
Sunflowers	12·1	12·3	12·20
Intertilled wheat	12·4	14·2	13·30
Summer-fallow	22·4	21·9	22·15

YIELD SUMMARY, SUMMER-FALLOW TREATMENT

—	Yield per Acre		
	Plot	Duplicate	Average
	Bush.	Bush.	Bush.
Cultivate in lieu of ploughing	21·6	24·6	23·1
Plough 3 inches	21·4	23·9	22·65
Plough 4 inches	21·1	24·4	22·75
Plough 5 inches	21·3	23·7	22·50
Plough 6 inches	21·5	25·7	23·60
Plough 7 inches	20·6	25·3	22·95
Plough 8 inches	20·8	24·1	22·45
Plough 9 inches	20·3	23·3	22·10
Apply manure before ploughing for summer-fallow	20·8	24·4	22·60
Apply on summer-fallow in fall, disk in	20·6	23·8	22·20
Plough 6 inches middle May	22·8	26·0	24·40
Plough 6 inches Middle June	20·8	21·0	20·90
Plough 6 inches middle July	13·4	11·3	12·35
Disk stubble in fall, plough 6 inches June	20·5	18·9	19·70
Disk stubble early spring, cultivate early June, plough early July	18·9	20·1	19·50
Disk stubble early spring, plough 6 inches in June	22·6	24·4	23·50
Stubble ploughed 6 inches in fall	19·7	19·7	91·70
Plough 6 inches in June, pack with disk	22·6	22·5	22·55
Plough 6 inches in June, pack with subsurface packer	20·4	21·4	20·90
Seed with ordinary double disk drill	23·0	21·7	22·35

STUBBLE TREATMENT

The evident observations from these experiments are:—

1. That although the yields on fall-ploughed plots were superior to those of the previous year because of the land being moist when fall ploughed in 1924, the superiority of spring ploughing still holds.

2. Deeper ploughing shows no advantage in the fall and a small advantage in the spring.

3. Packing after fall ploughing decreased the yield, and but slightly increased it after spring ploughing.

4. Manure gave a slightly increased yield.

5. Disking in the fall lowered the yield by destroying the stubble.

6. The practice of burning the stubble in the spring and then ploughing six inches deep proved, as in 1923 and 1924, to be the highest-yielding method of stubble treatment.

SUMMER-FALLOW SUBSTITUTES

In considering the yields of wheat following fallow substitutes, corn land again proved most productive. The wheat yields following sunflowers and intertilled wheat were seriously affected by the moisture withdrawals of the intertilled crops.

A change in the treatment of the intertilled crops was commenced this year. The potatoes, sunflowers, and corn were planted in check-rows to admit of cross-cultivation and to eliminate the formerly necessary and expensive hoeing. This system did not control the Russian thistle, which provided serious competition to the growing intertilled crops and undoubtedly made great demands on the soil moisture. The intertilled wheat was seeded as usual in single rows thirty-six inches apart. Three cultivations failed to control the thistles and they had to be mowed.

SUMMER-FALLOW TREATMENT

The more important deductions from the year's work with summer-fallow treatment are:—

1. That, with regard to depth of ploughing between three and nine inches inclusive, little difference in yield resulted.

2. Manure had a small, but unprofitable effect, when applied to the fallow.

3. The usual significant decrease in yield with the postponement of ploughing from May 15 to July 15 was noted.

4. Fall disking had no effect in increasing yields, while fall ploughing showed a considerable decrease.

5. Early spring disking by checking weed growth had a beneficial effect on yields.

6. The effects of packing after ploughing were not marked, but the usual superiority of the disk over the sub-surface packer was again seen.

7. No significant differences in yield between wheat seeded with the single-disk press-drill and with the double-disk drill without press attachment could be noted. The grain that was not pressed after seeding burnt first under the influence of dry weather.

The average yields of the past two years, 1924 and 1925 show the following results:—

STUBBLE TREATMENT (YIELDS EXPRESSED IN BUSHELS)

	Yield per acre
	Bush.
Fall plough 3 inches–4 inches	6·86
Spring plough 3 inches–4 inches	13·50
Fall plough 6 inches	6·47
Fall plough 6 inches and pack	5·35
Spring plough 6 inches	14·24
Manure before spring plough 6 inches	14·42
Spring plough 6 inches and pack	14·19
Stubble disk, at harvest, fall plough	6·38
Stubble disk at harvest, spring plough	8·83
Disk stubble in spring	9·36
Burn stubble in spring and plough	15·14
Burn stubble in spring and disk	13·97

	Yield per acre
	Bush.
Summer-Fallow Substitutes	
Potatoes	11·33
Corn	13·62
Corn, (Manured)	11·41
Sunflowers	8·20
Intertilled Wheat	10·61
Summer-fallow	19·21
Summer-fallow Treatment	
Cultivate in lieu of ploughing	20·58
Plough 3 inches	21·41
Plough 4 inches	21·61
Plough 5 inches	22·04
Plough 6 inches	22·79
Plough 7 inches	21·79
Plough 8 inches	21·01
Plough 9 inches	21·04
Apply manure before ploughing for summer-fallow	18·47
Apply on summer-fallow in fall, disk in	18·62
Plough 6 inches middle May	12·67
Plough 6 inches middle june	18·15
Plough 6 inches middle July	10·64
Disk stubble in fall, plough 6 inches in June	17·93
Disk stubble early spring, cultivate early June, plough early July	18·33
Disk stubble early spring, plough 6 inches in June	19·68
Stubble ploughed 6 inches in fall	18·18
Plough 6 inches June, pack with disk	17·62
Plough 6 inches June, pack with subsurface packer	16·42
Seed with ordinary double-disk drill	18·70

CROP ROTATIONS—DRY LAND

Seven rotations are established on the non-irrigated and two on the irrigated part of the Station. These have been under way for from three to fourteen years and careful cost and return data have been kept each year. In addition to the rotations, one dry-land field has been planted to wheat every year since 1911, and an irrigated field was planted to alfalfa in 1909 and has not been broken since.

Cost Values for the Season of 1925

Rent and taxes dry land	per acre	$ 2 50
Rent and taxes irrigated land	per acre	8 00
Manure	per ton	1 00
Seed wheat	per bushel	1 80
Seed oats	per bushel	0 68
Seed barley	per bushel	1 20
Seed peas	per bushel	3 00
Seed rye	per bushel	1 12
Seed corn	per pound	0 08
Alfalfa seed	per pound	0 35
Sweet clover	per pound	0 12
Rye grass	per pound	0 08
Brome grass	per bound	0 08
Sugar beet seed	per pound	0 15
Twine	per pound	0 15
Machinery	per acre	1 00
Manual labour	per hour	0 30
Horse labour, per horse	per hour	0 10
Threshing wheat and peas	per bushel	0 14
Threshing barley	per bushel	0 12
Threshing oats	per bushel	0 10
Ensiling	per ton	1 30

Return Values for the Season of 1925

Wheat	per bushel	$ 1 20
Oats	per bushel	0 40
Barley	per bushel	0 55
Rye	per bushel	0 75
Peas	per bushel	2 50
Alfalfa hay, and pea and oat hay	per ton	10 00
Corn ensilage	per ton	3 50
Wheat straw	per ton	Nil.
Oat and barley straw	per ton	2 00
Pea straw	per ton	Nil.
Pasture one horse or cow	per month	1 50
Pasture one sheep	per month	0 30
Sugar beets	per ton	6 00

Wheat is the principal cash-crop used in the dry-land rotations, but in one, alfalfa in rows for seed has been included to furnish a cash-crop as well as to replenish soil fertility. The returns from the alfalfa seed, however, have been disappointing. Wheat so far stands as premier cash-crop on the dry farm. Corn either for silage or for "hogging off" is the most promising as a hoed crop and is gaining in favour among the wheat farmers. This crop has also possibilities as a cash-crop where early varieties are grown for seed. In sections infested with Russian thistle the cost of keeping the crop clean is a serious handicap to corn-growing.

The most difficult problem in working out satisfactory rotations in the drier sections is the growing of a grass or legume hay or pasture crop to replenish the fibre of the soil. Sweet clover would so far appear to be the most promising legume and brome and western rye the most promising perennial grasses. The place that these crops can take is still a matter for experiment, more perhaps to determine the most successful way to obtain a stand than their place in the cropping system.

All of the dry-land rotations are on land similar both as to soil and topography so the following data on the various rotations are comparable.

SUMMARY OF YIELDS AND PROFITS PER ACRE DRY-LAND ROTATIONS

Rotation "J"—6 Year's Duration

Rotation year	Crop	Yields		Profit or loss (−)	
		1925	Average for 4 years	1925	Average for 4 years
				$ cts.	$ cts.
1	Summer-fallow				
2	Wheat	24·33 bush.	24·51 bush.	6 64	2 01
3	Wheat	10·33 bush.	15·42 bush.	−0 09	0 18
4	Oats seeded with alfalfa 10 lb., western rye grass 10 lb.	.....	21·54 bush.	−10 78	−3 03
5	Hay	1·26 ton	0·46 ton	1 51	−3 72
6	Hay or pasture	0 81 ton	0·32 ton	−2 54	−3 21
	Field average	.....	.....	−0·88	−1 29

Rotation "Z"—5 Years' Duration

1	Summer-fallow				
2	Wheat	21·67 bush.	19·67 bush.	2 47	1 02
3	Oats	22·94 bush.	21·79 bush.	−4 03	−3 18
4	Oats seeded with sweet clover	16·65 bush.	11·39 bush.	−5 61	−6 21
5	Hay or pasture	.....	0·20 ton	−8 25	−3 04
	Field average	.....	.....	−3 08	−2 28

Field A—Wheat Continuously

1	Wheat	0·0 bush.	(average 14 years) 5·85 bush.	−9 55	(average 14 years) 3 72

Rotation "B"—2 Year's Duration

1	Summer-fallow				
2	Wheat	32·29 bush.	37·84 bush.	18 02	4 09
	Field average	16·14 bush.	18·92 bush.	9 01	2 04

SUMMARY OF YIELDS AND PROFITS PER ACRE DRY-LAND ROTATIONS—*Concluded*

Rotation "C"—3 Year's Duration

Rotation year	Crop	Yields		Profit or Loss (−)	
		1925	Average for 14 years	1925	Average for 14 years
				$ cts.	$ cts.
1	Summer-fallow				
2	Wheat	25·42 bush.	28·00 bush.	11 15	7 30
3	Wheat (oats to 1923)	12·50 bush.	.....	1 75	5 58
	Field average	15·97 bush.	.....	4 30	4 29

Rotation "M"—6 Year's Duration

1	Summer-fallow				
2	Winter wheat	26·53 bush.	27·31 bush.	5 08	2 63
3	Oats	40·94 bush.	42·57 bush.	0 98	3 39
4	Summer-fallow				
5	Peas and oats	1·94 ton	2·21 ton	−11 57	−0 32
6	Oats	38·35 bush.	50·99 bush.	− 0 01	4 74
	Field average	.....	.....	− 0 92	1 74

Rotation "S"—9 Year's Rotation

1	Summer-fallow				
2	Corn	6·05 ton	8·64 ton	−12 73	−2 91
3	*Winter rye	3.10 bush.	.....	7 85	−3 93
4	Summer-fallow				
5	Wheat	24·53 bush.	27·36 bush.	8 91	3 14
6	Oats	20·94 bush.	39·74 bush.	−3 85	2 86
7	Summer-fallow				
8	Peas and oats	1·66 ton	2·15 ton	−14 96	−1 97
9	*Wheat	17·20 bush.	30·53 bush.	7 84	11 48
	Field average	.....	.....	−0 77	0 96

Rotation "T"—10 Year's Duration

1	Summer-fallow				
2	Winter wheat	24·48 bush.	26·48 bush.	7 84	6 63
3	Oats	17·44 bush.	53·50 bush.	−6 54	5 35
4	Alfalfa seeding	.....	.....	−28 41	−14 67
5	Alfalfa seed	.....	.....	−8 08	6 78
6	Alfalfa seed	.....	.....	−8 29	9 27
7	Alfalfa seed	0·9 tons	.....	−1 73	5 53
8	**Summer-fallow	0·35 ton			
9	Corn	5·61 ton	.....	−12 75	−2 74
10	Spring wheat	22·6 bush.	19·44 bush.	14 14	10 50
	Field average	.....	.....	−4 38	2 68

*Changed places, 1925. **Hay cut before ploughing for fallow.

ROTATIONS ON IRRIGATED LAND

The establishment of satisfactory rotations for irrigated farms of southern Alberta is not difficult as almost any crop adapted to a temperate climate can be grown here when sufficient moisture is available. The farmers on irrigated lands are not rotating their crops to any extent, however, regardless of the ease with which it could be done, for while most of them are growing both alfalfa and grain on their farms, two crops that rotate well together, the alfalfa is usually planted in one field and left there unbroken for a number of years, while grain is grown continuously on another part of the farm. Among the reasons for this condition are: (1) Alfalfa is a long-lived perennial that does not reach its maximum productiveness for two or three years after seeding and as it continues to give undiminished returns for ten to twenty years the farmer hesitates to plough up the crop when it has been down but a few years, especially as the seed to replant is expensive. (2) Most of the farms are larger than the farmer can successfully operate with his available capital, a condition which he thinks forces him to seed part of the farm to alfalfa and leave it as a permanent hay meadow to reduce the acreage requiring tillage.

Continuous grain growing cannot be followed indefinitely, in fact many farms have now become so polluted with weeds by this practice that grain cannot be grown with profit and some kind of rotation is being forced on the farmer. Fortunately almost any of these run-down fields can be brought back to a high state of fertility and the weeds effectively controlled by seeding down to alfalfa for a few years, so the situation is not of a permanently serious nature.

It is noticeable that several of the leading farmers are ploughing up some of their old alfalfa fields and seeding the run-down fields to alfalfa. Another method of restoring impoverished land that is gaining in favour is to seed sweet clover with the grain crop then use sweet clover for pasture or in some instances for the production of seed or hay the succeeding year, and return to grain the third season.

All the established irrigated rotations at the Station have alfalfa as the basic crop, and as the following tables show, the yields have kept up to a high level. Each field in rotation "U" is in alfalfa six years. The alfalfa is then broken and the field seeded to wheat followed by a hoed crop then oats and then alfalfa seeded with barley. For eleven years potatoes were the hoed crop used, but since 1923 sugar beets have been grown instead of potatoes, but have not fitted into the rotation as well, for sugar beets do not yield well after wheat and have not followed alfalfa satisfactorily because of volunteer alfalfa and undecayed roots interfering with cultivation and necessitating excessive hoeing. For this reason, the continuity of the tilled crops have been changed in an endeavour to find a satisfactory place for the beets. So far no satisfactory place has been found for the sugar beets and it appears that it will be necessary to work out another rotation for this crop. Sweet clover as the legume to keep up soil fertility might be used to advantage in a rotation designed particularly for sugar beets.

While sweet clover has not been used in a rotation on the irrigated land at the Station it has been grown for several years and heavy crops of grain and other crops have always followed its use. The principal objection to sweet clover is disposing of the crop as it has little market value as hay, and most of the farmers do not have sufficient live stock to utilize a large acreage for pasture or hay. As more cattle and sheep are kept on the farms, however, it is probable that the use of sweet clover as a rotation crop will increase.

SUMMARY OF YIELDS AND PROFITS PER ACRE ON IRRIGATED ROTATIONS

Field "V"—Alfalfa continuously

Rotation year	Crop	Yields		Profit and Loss (−)	
		1925	Average for 14 years	1925	Average for 14 years
				$ cts.	$ cts.
	Alfalfa	3·00 tons	3·95 tons	13 68	34·22

Rotation "U"—10 Years' Duration

1	Alfalfa	2·26 tons	1·91 tons	4 10	7 38
2	Alfalfa	2·08 tons	3·57 tons	2 83	27 93
3	Alfalfa	2·78 tons	4·02 tons	8 95	32 09
4	Alfalfa	3·03 tons	3·93 tons	11 04	34 29
5	Alfalfa	3·56 tons	4·44 tons	15 34	36 44
6	Alfalfa	2·75 tons	4·56 tons	4 73	38 59
7	Wheat	45·33 bush.	46·79 bush.	27 71	27 94
8	Oats	86·47 bush.	90·31 bush.	10 91	17 24
9	Sugar beets	7·75 tons	10·68 tons	−16 02	*141 29
10	Barley	85·63 bush.	52·36 bush.	23 79	11 29
	Field average			9 34	37 45

Rotation "X"—15 Years' Duration

			Average for 11 years		Average for 11 years
1–5	Alfalfa	3·44 tons	3·83 tons	14 71	9 16
6–10	Alfalfa	3·35 tons	4·56 tons	14 79	25 86
11	Barley	65·83 bush.	40·53 bush.	12 51	4 29
12	Corn	11·04 tons	6·82 tons	−5 75	−0 29
13	Wheat	43·50 bush.	29·68 bush.	26 85	15 12
14	Oats	61·47 bush.	58·59 bush.	2 78	4 31
15	Peas	30·17 bush.	19·11 bush.	47 58	12 45
	Field average			15 43	14 07

*Average profit *is* for 11 years of potatoes and 3 ysars of sugar beets.

IRRIGATION EXPERIMENTS

Experiments for the purpose of studying the proper use of irrigation water on wheat, alfalfa, pasture grasses, brome, sunflowers, potatoes, and sugar beets have been under way at the Station for from one to four years.

The purpose of the investigation is to obtain information regarding:—

(1) The stage of development of crops when the first and subsequent irrigations of the season should be applied.

(2) The moisture content of the soil when crops require irrigation.

(3) The most profitable number of irrigations for different crops.

(4) The value of fall irrigation.

(5) The optimum depth of water per application for the soil on this station.

(6) The correlating of data obtained, in an endeavour to find a way for relieving the peak load of water required in June and July.

PLAN OF EXPERIMENT

(1) Plots—Duplicate one-twentieth or one forty-sixth-acre plots are used for all crops. Each plot is made level and is surrounded by a ditch, the bank making a border dike entirely around the plot, thus forming a basin. This arrangement permits the proper control of the amount of water applied and insures even distribution over the plots.

(2) Soil—The soil is a medium sandy clay chocolate loam with a subsoil of similar texture and is remarkably uniform.

(3) Application of water—(a) The stage of plant growth has been used as the basis for determining the time of irrigation. In addition, some of the plots are irrigated in the fall, one pair when the condition of the crop and soil indicates a need of water and one pair of plots receive no irrigation. (b) The depth of water per application for non-intertilled crops is six inches, while for intertilled crops three inches has been decided upon. Where any modification of this practice is made, it is for the purpose of studying the effect of heavier or lighter irrigation. This modification consists of four and eight inches for wheat and alfalfa and two, four and five inches for hoed crops. Some of the grass plots receiving frequent irrigations are given but three inches per application.

(4) Soil moisture—Soil moisture determinations are made of each foot of soil to a depth of six feet in the spring, before and after each irrigation, in the fall after harvest, and at other times as deemed advisable. Samples also have been taken periodically to a depth of twelve feet to determine if conditions of underground seepage or the formation of a water-table was influencing results. In part of one set of plots a water-table developed. This field was abandoned and the data obtained from the affected plots discarded.

WHEAT

Two series of wheat plots have been under test for four years. One of these sets was in wheat the preceding spring and the other in a cultivated crop. The first year of the experiment, sunflowers was the cultivated crop preceding the wheat crop. Since that time potatoes have been used. Marquis wheat was used in the tests and the crop was irrigated at one or more of the following stages: (1) previous fall; (2) two leaves showing; (3) five leaves showing; (4) shot blade; (5) flowering; (6) soft dough; (7) when crop appeared to need water.

The results of the tests conducted supplemented with twenty years' accumulated irrigation experience of southern Alberta show that good crops of the wheat can be secured almost always on fall-irrigated land without further use of water during the growing season. In the very dry years one additional irrigation is desirable, usually when the plants are in the boot stage.

If a fall irrigation has not been given the water should be applied early enough after the grain is up in the spring to keep the crop from burning. Where a large acreage must be covered it is dangerous to wait until the crop shows signs of needing water before commencing to irrigate. A safe practice and one that should be adopted generally is to commence irrigating when four or five leaves show on the plant unless there is a good supply of moisture in the soil to a depth of at least four feet. If the spring is very dry and there is no reserve moisture in the soil the farmer should not hesitate to commence irrigating as soon as the crop is above the ground. On some soils, water applied when the plants are small may check growth somewhat but the injury will be slight compared to the serious loss that will be sustained if the grain is allowed to burn.

Irrigating of the test plots in early May when two or three leaves were formed on the plants has given no decrease in yields over later irrigation except one year (1924) when hot drying winds and absence of rain increased the water

requirements of the crop to such an extent that one early irrigation was not sufficient to supply the needs of the crop, but every year yields were lowered materially when water was not applied until the crop had commenced to burn.

From present knowledge, then, the recommended irrigation practice for wheat on fertile, medium to heavy soils is to irrigate in the fall if possible and in the very dry seasons apply the water again about the boot stage. Where a fall irrigation has not been given care should be taken to get the water on in the early summer before the crop starts to burn. This one irrigation is usually sufficient but if needed a second should be given. Soil that is very sandy or low in fertility will require more water than heavier or rich soils.

POTATOES

Irrigation experiments with potatoes have been under way for four years. Irish Cobbler is the variety used and these have been planted in rows three feet apart using from 1,200 to 1,300 pounds of seed per acre. The first irrigation of the season has been applied at one of the following stages of growth: previous fall, crop half grown, starting bloom, full bloom or ten days after full bloom. Subsequent applications of water were made at intervals of ten or twenty days.

During the four years of the test a fall irrigation has been given a good crop of potatoes every year and in only one season has the yield been materially increased by additional applications of water during the growing season.

One of the most outstanding results observed in this experiment is that where the potatoes were irrigated when the vines were about half grown the yields were from 20 per cent to 30 per cent lower than from plots that were not irrigated until the plants started to bloom. It would seem then that unless the soil is dry so that there is danger of the plants burning, it would be advisable to postpone irrigation until bloom is started. As the acreage planted to potatoes is usually small the crop can be irrigated in a short period of time, so unlike wheat, it is safe to wait until soil conditions show that the crop will soon be in need of water. While irrigating early in the season seemed to injure the plants, no harmful effects were apparent from water applied after the plants started to bloom even if they were not in need of water. After this period it is important that potatoes are not allowed to become dry as the tubers may start to ripen and a subsequent irrigation start a second growth with the result that the potatoes are rough with knots or in extreme cases may form a chain of small tubers, one growing on sprouts from the other.

Where the potatoes were given more than four irrigations in the test plots the tubers had a tendency to be soggy and knotty and the lenticels were enlarged. A safe irrigation practice for potatoes is to fall irrigate and then if the season is dry apply water again when the plants start to bloom and every two or three weeks until about August 20.

ALFALFA

The alfalfa plots used for irrigation tests were seeded in 1922 and the first crop obtained in 1923 so that three years' data are now available.

Water was applied at one or more of the following stages of growth: previous fall, early spring, first crop 12 inches high, before cutting first crop, after cutting first crop, second crop 12 inches high and where three crops were cut an irrigation was given immediately after the second crop was harvested. Six inches of water were used per application except on two sets; one of these received four inches and the other eight inches.

The water requirement of alfalfa is greater than that of wheat, in fact it takes about the same number of irrigations for one cutting of alfalfa as for a wheat crop. A fall or early spring irrigation gave a good first cutting in most years but another application when the crop is 12 inches to 16 inches high,

usually increased the yield. An irrigation just before or just after the first crop was cut and another when this crop was about 16 inches high insured a good second cutting even in the very dry years.

Where only one irrigation was given the heaviest yields were obtained when this was applied when the first crop was about 12 inches high, for while the first crop was usually smaller without an early irrigation, the second crop was decidedly better, giving a larger total for the two cuttings.

PASTURE GRASSES

Three sets of dulplicate plots were seeded in 1922 to a mixture of six pounds each of western rye grass, Kentucky blue grass, meadow fescue and four pounds of alfalfa seed per acre. A good stand of all the grasses and alfalfa was obtained.

All the plots were irrigated in early May and one set at intervals of two weeks, one at intervals of three weeks, and one at intervals of four weeks throughout the season. Yields were obtained by cutting two one-thousandths of an acre on each plot, when the plants were six to ten inches high, and weighing immediately. After cutting a sufficient number of sheep were turned on to eat off all growth in three days.

For the mixture of grasses used there seemed to be little gained by irrigating more often than every three weeks. Irrigating at four-week intervals gave only slightly inferior results to three-week intervals.

BROME GRASS

The brome grass was irrigated at two-, three- and four-week intervals until cut for hay on July 31. Only one cutting was made and there was but little difference in the yields of the various plots thus indicating that no advantage was gained by irrigation more frequently than every four weeks.

SUGAR BEETS

Sugar beets were included in the irrigation tests this year for the first time. From one to five irrigations were given, the first having been applied immediately after the crop was thinned or two, five, six or eight weeks after thinning. Subsequent application of water were made at intervals of two, three, four, six or nine weeks. The crop was seeded April 29, thinned June 12 and harvested October 21.

The beets did not appear to require water this year until about July 18, or five weeks after thinning, as plots irrigated at any time up to that date gave maximum yields if subsequent irrigations were satisfactory, but where the water was withheld until a week later the crop burned quite badly and the yield was materially decreased. Irrigating immediately after thinning did not appear to injure the crop, in fact, the highest yield in the test was obtained with one irrigation applied immediately after thinning and another nine weeks later.

Representative samples of beets were secured at the time of harvesting and forwarded to the Canadian Sugar Company's factory at Raymond where tests were made of the sugar content and purity of the various samples. An interesting feature observed in a comparison of the results of these tests was that in every case where the beets were allowed to burn seriously before irrigating, the sugar content was decidedly below the average and was the lowest of any beets in the experiment. The only other treatment that produced beets of a similarly low sugar content was that giving five irrigations during the season, which appeared to be an excessive amount of water.

SEASONAL USE OF WATER ON THE STATION FARM

The accompanying table gives the number of acre-feet of water used on the Station farm in periods of ten days for the seasons of 1922, 1923, 1924 and 1925. The chart presents this data in graphic form and shows clearly the seasonal fluctuations in the water requirements of a diversified farm. Each line on the chart represents the water used in one year and while the lines do not run parallel, they coincide in a general way, that is, the greatest and least use of water each year have been at about the same periods.

It will be noted that irrigation commenced between the first and fifteenth of May of each year but one. In 1922 the water was not used until June 6, as all of the alfalfa and pasture on the farm was irrigated the previous fall and therefore did not require water until the first crop was well advanced. With the exception of 1924, the demand for water was light until the first week in June, as only pastures and hayfields, not irrigated the previous fall, required water in May. In June fall-irrigated alfalfa, pastures, and some grain needed irrigating, so that the amount of water used increased. The heaviest use was from the forepart of July until the middle of August when almost all crops on the farm required irrigation.

One interesting feature shown by th chart is the uniform use of water in 1925 from the middle of June to the middle of August. During this period, there were no high peaks as in previous years as all crops were irrigated before they showed signs of becoming dry so there was no time when it was necessary to use a large amount of water in a short period to prevent crops from being injured by drought.

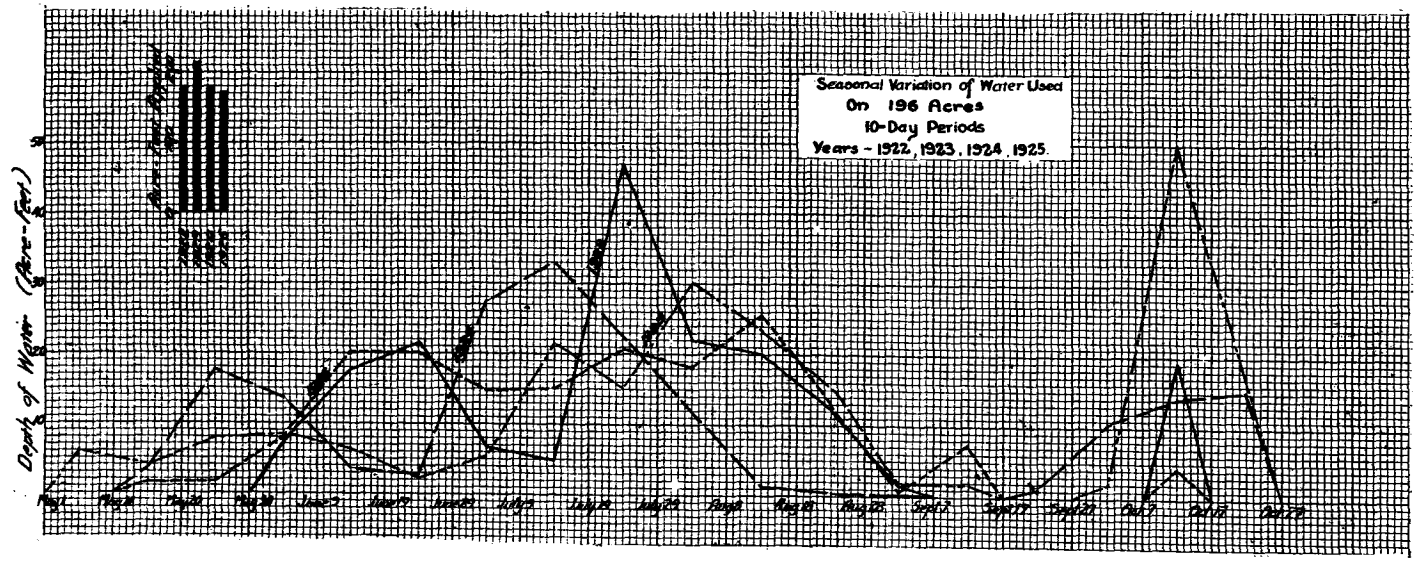
Each year's work with irrigation problems shows more clearly the possibility of decreasing the peak load requirements of water and thereby increasing the efficiency of irrigation projects and the number of acres that a canal system can satisfactorily serve by using the water more uniformly throughout the season. As the greatest amount of water is now used in July and August and as but little is used in May, early June and September, the problem resolves itself into finding a use for more water at these slack times on crops that are irrigated in July and August but that could be irrigated at other times without materially decreasing yields. The irrigation studies made at the Station show that grain grown on soils as retentive of moisture as are most of the irrigated soils of southern Alberta produce practically as well when irrigated early in June as when irrigated later and that usually no more water is required that year. Earlier irrigation of grain, therefore, appears to be one way of reducing the heavy demand for water at the time the usual peak is experienced later in the summer.

The value and possibility of fall irrigation has ben established and any fall irrigation on land that is to be cropped with grain will decrease the amount of water required the following summer.

FOUR YEARS' USE OF WATER ON 196 ACRES IN PERIODS OF 10 DAYS—LETHBRIDGE STATION

(In Acre-feet)

Period	May 1 to May 9	May 10 to May 19	May 20 to May 29	May 30 to June 8	June 9 to June 18	June 19 to June 28	June 29 to July 8	July 9 to July 18	July 19 to July 28	July 29 to Aug. 7	Aug. 8 to Aug. 17	Aug. 18 to Aug. 27	Aug. 28 to Sept. 6	Sept. 7 to Sept. 16	Sept. 17 to Sept. 26	Sept. 27 to Oct. 6	Oct. 7 to Oct. 16	Oct. 17 to Oct. 27	Total
1922....				7·28	17·68	21·41	6·91	4·99	46·81	21·94	19·99	11·96	1·30	.....	.....	.....	19·25	.....	179·52
1923....	6·02	3·97	7·82	8·58	6·29	2·08	5·21	21·52	15·08	30·23	23·46	14·40	1·91	1·81	.....	2·00	50·34	13·03	213·75
1924....	.....	3·64	17·50	13·54	3·72	2·60	27·41	33·04	22·41	11·65	1·36	0·39	0·26	.....	1·22	10·40	14·07	15·36	178·57
1925....	.....	1·60	1·50	8·03	20·51	20·64	14·81	15·10	20·85	18·32	25·59	13·10	0·52	7·28	.....	.....	4·68	.....	172·53



HORTICULTURE

Work in horticulture is carried on both on the dry and irrigated land. The dry-land vegetable garden is confined to a demonstration of the possibilities of a dry-land farmer's garden, while in the irrigated garden more extensive work is carried on with variety tests and cultural work.

SEASON

The season was exceptionally good for garden produce, especially the warm-season vegetables such as tomatoes, melons, squash, etc. The cross-bred apples came through the winter in good condition and produced a fair crop of fruit. The standard apple trees, however, suffered some winter-killing and very little fruit set. The small fruits as usual yielded well. The harvesting of root crops was made exceedingly difficult in the fall with the continuous rains, snow and frost. The potatoes at the surface of the ground were frozen in some instances so that the crop required greater care than usual in gathering. The good weather which followed this unusual wet spell allowed the ordinary fall work to proceed favourably. The last frost in the spring occurred on May 11, the first frost in the fall occurred on September 20, and the first killing frost on September 20.

VEGETABLE GARDEN—DRY-LAND

The dry-land garden yielded well, considering the dry spell which checked the growth considerably during the growing season. The first sowing was made on April 13, at which time the soil was in excellent condition in regard to moisture for germination of seeds.

One row, one hundred feet long of each vegetable was planted. The rows were put three feet apart to allow ample room for horse cultivation and so reduce hand labour as much as possible. The possibilities of success of a vegetable garden on dry land is 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 nine feet out on either side is a practice that can be recommended on dry-land. This could be done when farming operations were slack, but before the growth of much vegetation. Cottonwoods, sharp-leaved willows and caraganas seem to do well for windbreaks. The rows should run north and south to give protection from the west winds. On the Station, single rows of cottonwoods are used, the trees being planted four feet apart. A closer wind-break can be made by planting either willow or caragana on the west side of the cottonwoods. Caragana makes an excellent wind-break alone, although it is slower growing and does not grow so high as the cottonwoods or willow. An advantage the caraganas have over the others is that crops can be grown much closer to it than to other windbreaks.

Beets.—Detroit Dark Red was the variety grown. The one-hundred-foot row yielding 306 pounds. The beets were of good table size and splendid quality.

Beans.—Bountiful was the variety grown. The beans made good growth and were of fairly good quality. Thirty-eight pounds of green beans were picked from the hundred foot row.

Corn.—Golden Bantam was planted for table use. The first picking was made on the 17th of August. One hundred and forty-eight cobs were pulled from the hundred-foot row.

Cucumber.—Three hills were planted on the 19th of May. The yield was light, twenty-eight full grown cucumbers being pulled from the three hills.

LETTUCE.—The plants ran quickly to seed during the hot weather. Grand Rapids was the variety grown.

ONIONS.—Danvers Yellow Globe was the variety used. The onions ripened up nicely before frost. The one-hundred foot row yielded fifty-eight pounds of onions of good size.

PARSNIPS.—Hollow Crown was the variety sown. The roots developed to a fair size and were of good quality. The one-hundred-foot row yielded ninety-eight pounds.

PEAS.—The variety planted was Thomas Laxton, yielding thirty-nine pounds of green peas from the hundred-foot row. The peas were of excellent quality.

POTATOES.—Nine rows of Irish Cobbler were planted on the 13th of April. The potatoes were sprouted previous to planting. New potatoes were ready for use on the 24th of June. Six-hundred and eighty pounds were dug from the nine one-hundred-foot rows.

In the test of varieties eighteen varieties were grown. These were planted on summer-fallowed land on May 14 and all varieties dug on October 13. The following tables gives the yields per acre and also the average yields per acre for thirteen years for the varieties grown that length of time.

POTATOES (DRY-LAND)

Variety	Yield of marketable potatoes	Yield of unmarketable potatoes	Total yield per acre	Average yield of marketable potatoes for 13 years
	bush.	bush.	bush.	bush.
Factor	361	40	401	249
Morgan Seedling	433	70	503	247
Gold Coin	358	33	391	245
Irish Cobbler	420	43	463	239
Table Talk	360	66	426	230
Dalmeny Beauty	321	56	377	230
Reeves Rose	291	20	311	228
Empire State	138	46	184	223
Wee Macgregor	380	25	405	216
Sutton's Abundance	403	46	449	
Cambridge Russet	303	66	369	*
Netted Gem	300	66	366	*
Eight Weeks	258	40	298	*
Early Ohio	253	30	283	*
Gold Nugget	251	48	299	*
Rural Russet	241	45	286	*
Russet Burbank	228	65	293	*
Netted Gem (Invermere)	200	68	268	*

*Have only been grown three years.

PUMPKIN.—Three hills of small sugar pumpkin were planted on the nineteenth of May. The pumpkins ripened up well, seventy-eight pounds being harvested from three hills.

RADISH.—The variety Scarlet Turnip White Tipped was used. Thirteen pounds of radishes were pulled before they ran to seed.

SPINACH.—Victoria was the variety planted. The plants ran to seed before the plants had attained much size.

SQUASH.—Three hills of Green Hubbard Squash were planted, yielding ninety-four pounds of well-ripened squash.

TURNIP.—Early Snowball was the variety sown. The quality was exceptionally good. Fifty-two pounds were pulled from the hundred-foot row.

DRY-LAND SMALL FRUITS

To be successful with small fruits it is important that they have the protection of a windbreak. On dry land on account of lack of moisture, the rows should be placed a good distance apart. For currants and raspberries, etc., the rows should be at least eight feet apart with the plants six feet apart in the rows. This will allow ample room for horse cultivation. To ensure a good crop frequent cultivation is necessary and the soil kept free from weeds. The dry-land small fruits gave fair yields this year, although the fruit was not so large as when grown under irrigation. Birds consumed a quantity of the fruit before it was all picked.

The following is the amount picked from the twelve bushes each variety:—

Black Currants.—Merveille de la Gironde, sixteen pints. Eagle, sixteen pints. Saunders, 10 pints.

Red Currants.—New Red Dutch, 32 pints. Red Grape, 29 pints. Cumberland, 25 pints.

White Currants.—White Grape, 34 pints. White Pearl, 31 pints. Large White, 27 pints.

Gooseberries.—Houghton, 18 pints.

IRRIGATED LAND VEGETABLE GARDEN

The irrigated garden was fall ploughed as usual as this permits of earlier seeding in the spring. The first sowing of all the vegetables was done on the 14th of April.

The season was especially favourable for tomatoes and melons, the yields of ripe fruit being heavy. The celery suffered an attack from the False Cinch Bug for the first time. Owing to the large numbers present, considerable damage was done before their ravages could be checked.

Asparagus.—The shoots were cut from half the plantation while the remaining half was left to grow uncut. Next spring observations will be made to determine what effect a season's rest of this kind will have on the size and strength of the shoots.

An exceptionally heavy crop of good quality was cut this year, Connover Colossal being the variety grown.

Beans.—Twenty-two varieties were grown for the production of string beans. Some of the varieties were too stringy, while others yielded light crops. Those recommended (with yield of green beans from a thirty-foot row) are:—Hodson Long Pod, 40 pounds. Canadian Wonder, thirty-one pounds. Masterpiece, thirty pounds. Stringless green Pod, twenty-six pounds. Davis White Wax, twenty-two pounds.

Beets.—Eight varieties were grown and all did well. The varieties recommended (with the yields from a thirty-foot row) are as follows:—Black Red Ball, 145 pounds. Early Wonder, 147 pounds. Detroit Dark Red, 185 pounds.

Borecole or Kale.—The young leaves made exceptionally fine greens after being touched by frost in the fall. Dwarf Scotch was grown this season and proved very satisfactory.

Brussels Sprouts.—Sutton Dwarf was the variety grown. Thirty plants were set out and twelve pounds of the sprouts were picked at time of frost.

Carrots.—The nine varieties tested all did well, although the quality of some were better than others. Those recommended (with yield from a thirty-foot row) are: Early Scarlet Horn, fifty-seven pounds. Half Long Scarlet Nantes, seventy pounds. Chantenay, one-hundred and thirty-three pounds.

Corn.—The fifteen varieties grown, varied considerably in earliness, yield and quality. The recommended varieties in order of earliness (with number of

roasting ears from 20 hills) are: Banting 114 cobs. Nuetta 118 cobs. Golden Bantam 158 cobs. Early Fordhook 102 cobs. Golden Giant 99 cobs.

CABBAGE.—Sixteen varieties were grown, consisting of early, midseason and late varieties. The seed was sown in flats in a hotbed. Later the plants were pricked out into other flats and spaced far enough apart to allow them sufficient room to make sturdy development. They were then gradually hardened off and planted in the garden on the 29th of May. It is not necessary to start late varieties in a hotbed. They can be sown thinly in rows outside and when large enough, thinned out to two feet apart. The following are the recommended varieties tested in order of earliness (with yield of trimmed cabbage from 30 plants): Early Jersey Wakefield 162 pounds. Golden Acre 236 pounds. Copenhagen Market 424 pounds. Kildonan 354 pounds. Late Danish Ballhead 263 pounds. The last named variety is an excellent variety for storing.

CAULIFLOWER.—Extra Early Dwarf Erfurt and Early Snowball were the two varieties grown. Both are good. The yield in each case from twenty heads were: Extra Early Dwarf Erfurt 125 pounds. Early Snowball 109 pounds.

CELERY.—Fifteen varieties were grown. Owing to the plants being badly eaten by the False Cinch Bug, the growth was considerably checked, which materially affected the yield. The recommended varieties (with yield from a fifteen-foot row) are: White Plume 44 pounds. Golden Self Blanching 35 pounds. Evan Triumph 61 pounds. Easy Blanching 55 pounds. The two last-named varieties are good winter varieties for storing. For the early varieties blanching with boards is the most convenient method, while the late varieties are better with soil.

CUCUMBER.—Four varieties were grown. The seed was planted in hills in the open, six feet apart on the 16th of May. The following yields were obtained from three hills: Early Fortune 144½ pounds. Improved Long Green 97 pounds. Davis Perfect 90½ pounds. West India Gherkin 20 pounds.

CITRON.—Three varieties were used and a good crop was obtained from each. The seed was planted in the open on the 16th of May in hills six feet apart. The yield from three hills of each was: Colorado 345 pounds. Colorado Preserving 310 pounds. Red Seeded 250 pounds.

EGG PLANT.—Four varieties were grown. The plants were started under glass and planted out in the first of June. Only one variety, Black Beauty, produced much fruit. Thirteen pounds was picked from twenty plants. The potato beetle is particulary fond of egg plants. Frequent dusting with Paris green and lime in equal proportions, or some other arsenic preparation is usually necessary to save the plants.

LEEKS.—Giant Carentan Broadleaf was the variety grown. The thirty-foot row yielded 21 pounds.

LETTUCE.—Sixteen varieties were grown, consisting of leaf, head, and Cos lettuce. All varieties did better this season than usual, although after the heads were full grown they quickly ran to seed. The varieties recommended (with yield from a fifteen-foot row) are: leaf, Grand Rapids 47 pounds. Cos, White Paris Cos 47½ pounds. Trianon Cos 41 pounds. Head, Iceberg 37 pounds. Drumhead 40 pounds. Prizehead 37 pounds. Improved Hanson 30 pounds.

MUSK MELON.—Six varieties were tested. The season was favourable for their development and a number of melons ripened.

ONIONS.—Sixteen varieties were grown. The onions were badly infested with onion maggot, which greatly reduced the yields. The recommended varieties are: White Barletta and White Pearl for pickling. South Port White Globe, South Port Yellow Globe, Yellow Globe Danvers, Ailsa Craig, and Giant Prize-taker. Numerous experiments are being carried on in conjunction with the local representatives of the Entomological Branch for the control of onion maggot.

PEAS.—There were twenty-two varieties grown, consisting of early, mid-season and late varieties. The recommended varieties (with yield from a thirty-foot row) are: Early Six Weeks 15 pounds. Early Wonder 20 pounds. Gradus 21 pounds. Thomas Laxton 30 pounds. Champion of England 23½ pounds. Stratagem 25 pounds. Telephone 21 pounds.

PEPPERS.—Four varieties were grown. The plants were started under glass and planted outside on the first of June. The yield of peppers from a thirty-foot row with the varieties arranged in order of their earliness are: Harris Earliest 12 pounds. Neapolitan 14 pounds. Large Red Cayenne 7 pounds. Chinese Giant 3 pounds. The peppers coloured up nicely when spread out in a dry, frost proof place.

PARSLEY.—The three varieties tried were Champion Moss Curled, Triple Curled, and Rennies XXX. They all made splendid growth.

PARSNIP.—Four varieties were grown. The seed being sown in hills nine feet apart on the 16th of May. The following yields were obtained from three hills in each case: King of the Mammoth 550 pounds. Mammoth Jumbo 470 pounds. Connecticut Field 400 pounds. Small Sugar 180 pounds. All of the pumpkins, however, were not fully ripe.

POTATOES.—Nineteen varieties were under test. Planted on the 14th of May, they were all dug on the 14th of October. The following table gives the yields per acre and also the average yields per acre for 13 years for the varieties grown that length of time.

POTATOES (IRRIGATED)

Variety	Yield of marketable potatoes	Yield of unmarketable potatoes	Total yield per acre	Average yield per acre for 13 years	Average yield per acre for 5 years
	bush.	bush.	bush.	bush.	bush.
Empire State	718	73	791	540	648·8
Table Talk	658	120	778	535	635·7
Dalmeny Beauty	631	86	717	534	607·12
Irish Cobbler	650	115	765	519	572·27
Factor	555	153	708	515	587·27
Gold Coin	366	136	502	509	583·36
Wee Macgregor	518	31	549	505	563·24
Reeves Rose	560	146	706	513	518·9
Morgan Seedling	460	116	576	496	567·52
Sutton Abundance	581	56	637		
Netted Gem (Invermere)	598	106	704	*	
Rural Russet	580	73	653	*	
Russet Burbank	578	158	736	*	
Netted Gem	575	81	656	*	
Cambridge Russet	530	115	645	*	
Eight Weeks	483	183	666	*	
Gold Nugget	465	118	583	*	
Early Ohio	461	133	594	*	
Great Scot	426	50	476	*	

*Have only been grown three years.

RADISH.—Nine varieties were grown. The recommended varieties (with yield from a thirty-foot row) are: Early Scarlet Turnip White Tipped, 7 pounds; Large Early Red Scarlet, 9½ pounds; White Strassburg, 11 pounds; Icicle, 13 pounds; XXX Scarlet Oval, 7 pounds.

SPINACH.—Victoria was the variety grown and produced an abundance of leaves.

SWISS CHARD.—The following three varieties were grown: Fordhook Giant, Lucullus, Rennie Spinach Beet.

SQUASH.—Six varieties were grown. The seed was sown in hills nine feet apart in the open on the 16th of May. The following yields were obtained from three hills: Perfect Gem, 70 pounds; Table Queen, 120 pounds; Kitchenette, 387 pounds; Golden Hubbard, 200 pounds; Green Hubbard, 120 pounds; Warty Hubbard, 207 pounds.

SALSIFY.—Sandwich Island was the variety grown, the thirty-foot row yielding 70 pounds.

SUNBERRY.—Burbank Orange was the variety grown, producing an abundance of ripe berries.

TOMATOES.—Thirty-five varieties were tested. The season was exceptionally favourable for the ripening of tomatoes the crop being particularly heavy. The recommended varieties with yield of ripe tomatoes from five plants were as follows: Burbank Early, 48 pounds; First Picking Earliana, 46¾ pounds; Alacrity, 0-6-6-1, 45 pounds; IXL Extra Early, 44¾ pounds; Carter Sunrise, 43½ pounds; Sparks Earliana, 40½ pounds; Abbotsford Argo, 39 pounds; Danish Export, 37 pounds; Bonny Best, 29¾ pounds.

VEGETABLE MARROW.—The seed of the two varieties tested was sown in hills in the open on the 16th of May. The hills were nine feet apart. The yields from three hills were: English Trailing Vegetable Marrow, 520 pounds.

WATERMELON.—Three varieties were tested. The season was reasonably favourable for their development as quite a number ripened.

HERBS.—Thyme, summer savory, sage and dill were grown, and did exceptionally well, making good growth.

RHUBARB.—The rhubarb as usual produced an abundance of strong stalks. To maintain strong plants it appears to be necessary in southern Alberta to grow young plants from seed, for when the plants are three or four years old they start to deteriorate. Rhubarb seed sown on May 14 made rapid growth and by fall a large percentage of the plants had stalks eighteen to twenty inches high. It is important that the seedlings be dusted until the plants are three or four inches high, as the flea beetle is very fond of the young leaves. A good dust can be made by using Paris green and lime in equal quantity and thoroughly mixed.

TOBACCO.—White broad-leaved Burley was the variety grown, the plants being started under glass and planted out on the first of June. The plants made strong growth and the leaves had sufficiently ripened to be harvested on the 12th September.

SMALL FRUITS, IRRIGATED

As the currant plantation is now getting old, the yields are much less than in former years. A new plantation has been set out using the varieties which have proven most satisfactory and the bushes should come into bearing in 1926. The robins and blackbirds reduced the yields considerably.

The varieties of currants recommended are: black currants—Topsy, Eclipse, Saunders, Bang Up and Magnus; white currants—Large White, White Grape and White Pearl; red currants—Red English, New Red Dutch, Red Dutch, Victoria, Moore Seedling and Red Grape.

GOOSEBERRIES.—Seven varieties are under test. The Houghton and Carrie are quite hardy, require no winter protection and fruit well, although smaller in size than the other five varieties which are only half-hardy. For best results with these, the branches should be spread out as close to the ground as possible without breaking them, and covered with soil. The soil must be removed when the buds show signs of swelling in the spring. These five varieties under test are: Alma, Barrett, Charles, Red Jacket and Silvia.

RASPBERRIES.—The raspberries as usual did splendidly, producing an abundance of fruit. Here again the yields were somewhat reduced by the birds. The yields from two rows each thirty feet long were: Herbert, 40 pints; Loudon, 38 pints; Early King, 36 pints; Ruby, 36 pints; Sarah, 35 pints; Marlboro, 27 pints; Sunbeam, 27 pints; Cuthbert, 24 pints, and Golden Queen, 20 pints.

STRAWBERRIES.—The yield was exceptionally good this year, the fruit being of good size and excellent quality. Many of the berries were pecked by birds and rendered useless for picking. Senator Dunlop was the heaviest-yielding variety tested.

TREE FRUITS

APPLES.—The cross-breds as usual came through in winter in good shape and produced a heavy crop of fruit. The Osman is a variety in this class that can be recommended. It seems perfectly hardy and the fruit is of good colour and fair size. The tree develops an upright habit of growth.

The standard apple trees did not fare so well as there was some little winter killing. Many of the trees had a rather sickly appearance until the end of June, when they seemed to rally and regained a healthy appearance and succeeded in making a good growth. Very little fruit set on any of these trees. Patten Greening bore a light crop. This variety is the hardiest standard apple grown here so far, also the most prolific.

PLUMS.—Only a very few trees of the Manitoba Selected Seedling plums fruited this year, probably due to the blossoms being touched by frost. Several of Hansen's named varieties have been growing here since 1922, namely: Hanska, Sapa and Opata; also the Aitkin and Cheney plums. All these varieties are only half hardy here, killing back more or less every year. In very favourable seasons some fruit is obtained. The best Manitoba Selected Seedlings so far tested at the Station are being used for propagation. It is hoped that in a few years sufficient stock will be on hand to get the farmers started with a few plum trees which are hardy and bear fruit of a quality that would be of value for home use.

FLOWERS

ANNUALS.—The annuals as usual made a beautiful display of colour until severe frost in the fall. Most of the worth while kinds of annuals can be sown in the open in well-prepared borders or beds when the soil has warmed up, and will in most seasons be in bloom for a good period of time before being injured by frost. It is important that a good seed-bed be made to receive the seed and care taken not to sow them too deeply. The required depth is usually to be found with directions on the package. The following kinds will be found suitable: snapdragons, nasturtiums, sweet peas, candytuft, mignonette, calendula, asters, stocks, phlox, verbena, African daisy, poppy, gaillardia, scabiosa, dianthus, balsam, pansy, lavatera, helichrysum, acrolinium, statice and rodanthe, the last four being everlastings.

PERENNIALS.—The perennials made a wonderful show of colour, commencing with the iris in the spring until the golden glow finished blooming in the fall. Everyone who owns a garden should plant some perennials as they are a more permanent planting requiring but little attention. They should particularly appeal to those who have but little time to bother with a flower garden. The old flower stalks should be cut down in the fall and the bed mulched with stable manure, which can be forked in after the frost is out in the spring. After the plants get large and too crowded, they may have to be lifted in the fall, divided up and pieces replanted.

Recommended kinds of perennials are: Iris, phlox, columbine, lychnis, pyrethrum, oriental poppy, Iceland poppy, pinks, delphinium, shasta daisy, coreopis, michaelmas daisy, campanulas, lupinus, and golden glow.

ROSES.—The rose bushes came through the winter in good shape, making strong growth through the summer, and bloomed profusely. For several years various methods of winter protection have been tried. The most satisfactory way found so far is to tie old sacking around the bushes as tightly as possible. They are then bent down and covered with two boards in the form of a "V." The boards are then covered with soil or manure, the ends left open until very cold weather. In the spring these openings should be uncovered when the weather moderates to prevent heating. The bushes can be entirely uncovered when danger of severe frosts is past.

Some of the varieties tested and found to do well, are: Mrs. John Laing, Mrs. R. G. Sharman Crawford, Ulrich Brunner, Captain Hayward, General Jacqueminot, Juliet, Baroness Rothschild, Conrad F. Meyer, Lady Ashtown, Gruss an Teplitz.

GLADIOLUS.—This stately and easily grown flower is being more generally grown than ever before. The bloom is particularly suitable for cut flowers and can be had in a wide range of colours. Unlike annual flowers, the corms are lifted after frost with the stalk attached and hung in a dry frost-proof place. In the spring they are cleaned off and the little cormlets may be saved and planted three inches apart in a row in the garden. Under favourable conditions some will bloom the first year.

DAFFODILS.—The daffodils made a fair showing, but are not as hardy as tulips. After the first season they begin to deteriorate in quality of bloom until they eventually die out altogether. The varieties grown were Golden Spur, Princeps, Victoria, Empress, Emperor, Sir Watkin, Cynosure, and Poëticus Ornatus.

TULIPS.—The tulips as usual presented a wonderful display of colour. They are particularly desirable as they are in bloom when there is no other bloom to brighten the garden. Some of the best varieties are: (Early flowering) Proserpine, La Reine, Chrysolora, Duchesse de Parma, Artus, Grace Darling, (Double) Murillo, Couronne d'Or' and Imperator Rubrorum. (Darwins) Bartigon, Clara Butt, Susan, Pride of Haarlem, Isis, Madam Krelage, Edmee, La Tulipe Noire, Antony Roozen.

The following table shows the remarkable increases made in four years. The tulips were not disturbed during that time.

BULB INCREASE

Variety	Number of large bulbs planted October, 1921	Number lifted, July, 1925			
		Large	Medium	Small	Increase
					p.c.
Proserpine	120	203	112	252	372·5
Joost Van Vondel	110	172	328	227	560·9
Duchesse de Parma	60	109	94	88	385·0
Keizerskroon	60	101	77	75	321·6
Chrysolora	60	89	82	68	298·3
Flamingo	30	76	67	83	653·3
La Reine	60	109	95	96	400·0
Queen of the Netherlands	30	41	30	40	270·0
Pink Beauty	40	55	19	23	142·5
Grace Darling	30	27	29	10	120·0
Vermillion Brilliant	30	29	54	69	406·6
Murillo	30	72	56	55	510·0
Couronne d'Or	20	8	12	10	50·0

BULB INCREASES—*Concluded*

Variety	Number of large bulbs planted October, 1921	Number lifted July, 1925			
		Large	Medium	Small	Increase
					p.c.
Imperator Rubrorum	80	74	95	200	361·2
William III	40	7	6	6	
La Merveille	40	50	93	122	562·5
Inglescombe Scarlet	20	23	46	94	715·0
Inglescombe Yellow	60	72	124	259	658·3
Bouton D'or	20	.....	33	216	1,145·0
Susan	60	68	110	135	421·6
Bartigon	60	39	130	251	600·0
Clara Butt	80	72	142	320	567·5
Gretchen	30	92	91	180	1,110·0
Edmee	30	32	33	90	416·6
Baronne de la Tonnaye	30	70	165	241	1,486·6
Prof. Rowenhof	40	46	79	100	462·5
Pride of Haarlem	80	137	210	263	662·5
La Tulip Noire	40	48	79	32	297·5
Isis	30	32	46	123	570·0
Nora Ware	30	35	62	100	556·6
Antony Roozen	30	32	57	65	413·3
Madam Krelage	60	68	132	220	600·0
Farncombe Sanders	70	74	114	431	784·2
Picotee	60	36	54	200	383·3
Fawn	20	24	34	63	505·0
Gesneriana Spathulata	20	33	43	60	580·0
Sunset	20	20	33	57	450·0
Isabella	20	12	32	48	360·0

SHRUBS TREES AND LAWNS

The flowering shrubs bloomed freely, brightening the grounds with a variety of colour. No home is complete without a few flowering shrubs around it. The following kinds have proved absolutely hardy and can be recommended: lilacs, bush honeysuckle, *Viburnum opulus sterile, Caragana frutescens, Caragana pygmæa, Rosa spinosissima.*

Both the deciduous and coniferous trees still continue to grow satisfactorily. The outstanding kinds are: (Deciduous) elm, ash, weeping birch, balsam, poplar and native cottonwood; (Coniferous) Canadian white spruce, blue spruce, lodgepole pine, Scotch pine, Swiss stone pine, and Douglas fir.

The lawns as usual looked particularly attractive, making a rich green carpet. The lawns were cut weekly to keep them trim. One irrigation was given during the summer and a second one late in the fall. This is usually sufficient to keep them looking well.

CEREALS[1]

The early part of the season was exceptionally favourable for the growth of cereal crops. The month of May was a very good growing month. The precipitation was very scanty, but all crops got well started and in June heavy rains occurred when they seemed to be most required. The same cannot be said of July. The weather throughout this month was very dry and warm, with only a few showers which were too light to be of any material benefit. The same conditions prevailed throughout the first half of August, and during these six weeks the grain suffered severely, with the result that ripening occurred about two weeks earlier than it normally does. Rainy weather commenced August

[1] The experimental work with cereals, and forage crops, is carried on under the supervision of Mr. W. D. Hay, who has compiled the data given under these headings.

14, and there were only a very few days during the latter half of the month, and the following two months when threshing could be carried on satisfactorily. The precipitation which fell during this period was much higher than the district usually receives and part of it came in the form of snow.

VARIETY TESTS—DRY LAND

Several of the older or better known varieties of wheat, oats and barley were tested in one-sixtieth acre plots on summer-fallowed land. These varieties as well as several of the newer ones, were also tested in rod-row plots, as is explained later in this report.

WHEAT

There were twenty-one varieties of spring wheat under test in one-sixtieth acre plots. These were seeded April 29, at the rate of seventy-five pounds per acre.

The moisture condition in the soil was very favourable at the time of seeding, and a good germination was secured on all plots.

WHEAT—TEST OF VARIETIES (DRY LAND)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Marquis (Chemist)	July 31	93·0	28·0	25·8	17·0
Marquis Ottawa 15	July 30	92·5	28·0	25·1	16·9
Kubanka	Aug. 5	98·0	33·5	37·5	16·3
Red Fife	Aug. 4	97·0	29·5	34·9	16·3
Red Bobs	July 30	92·5	32·5	22·8	14·9
Ruby	July 27	89·5	32·0	20·0	12·5
U. of A. No. 222	July 31	93·0	33·5	39·0	
Kota	Aug. 1	94·0	36·0	33·8	
Golden (Sask.)	Aug. 1	94·0	31·0	30·8	
Ceres	July 29	91·0	33·0	30·0	
Kitchener	Aug. 4	97·0	30·0	29·9	
No. 1656	July 29	91·0	33·0	29·3	
Producer	July 31	93·5	35·5	28·4	
Marquis 10B	July 31	93·5	30·5	28·3	
Kahla	Aug. 7	100·0	30·0	25·9	
Supreme (Wheeler)	July 31	93·5	30·5	25·3	
Reward	July 28	90·0	32·0	25·0	
Renfrew	Aug. 3	96·0	34·0	24·8	
Early Triumph	July 30	92·5	32·5	22·3	
Acme	Aug. 5	98·5	30·5	21·8	
Brownie	July 30	92·5	32·5	19·0	

While the Marquis strains are not outstanding as far as this year's results are concerned, it is important to note that of the six varieties grown for a period of eight years, two of these strains are leading. Kubanka, a Durum wheat, is generally one of the highest yielders, although on account of its inferior milling qualities it is not one that can be recommended for the district. Attention should be drawn to the fact that one season's results are never so reliable as the results over a period of years, so that the standing of those grown for eight years is more representative of their relative yielding capacity.

OATS

Eight varieties of oats were tested in one-sixtieth acre plots. They were seeded April 29, at the rate of 85 pounds per acre.

The oat varieties did not suffer from drought to nearly the same extent as did the wheat and good results were obtained in all cases.

OATS—TEST OF VARIETIES (DRY LAND)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Victory	July 31	93·0	37·0	80·7	37·2
Danish Island	July 29	91·0	34·5	56·3	31·3
Banner	July 28	90·0	33·5	50·7	30·7
Gold Rain	July 26	88·0	33·5	49·4	29·2
Alaska	July 27	89·0	31·0	60·0	
Leader	July 30	92·0	32·0	59·1	
Laurel	July 27	89·0	31·0	51·2	
Longfellow	July 24	86·0	31·0	48·6	

Four of these varieties have been grown for the past eight years and their order of yield this year is the same as their order of yield over that period. Victory has a lead this year of twenty bushels over the next highest and also a considerable lead for the eight-year average.

BARLEY

A comparative test was conducted of sixteen varieties of barley in one-sixtieth acre plots. Seeding was done April 30, and the rate in all cases was 72 pounds per acre. The dry weather of July hastened the ripening of these varieties, and as a result the quality of grain was considerably reduced.

BARLEY—TEST OF VARIETIES (DRY LAND)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Bark's	Aug. 5	97	22·0	55·6	25·8
Odessa	July 24	85	27·0	32·5	22·5
Early Chevalier	July 21	82	30·0	43·2	21·4
O. A. C. 21	July 22	83	29·0	27·1	19·8
Gold	Aug. 6	98	23·0	41·7	19·6
Invincible	Aug. 7	99	25·5	39·5	18·1
Cape	July 20	81	30·0	53·6	
Trebi	July 19	80	25·5	52·2	
Swedish Chevalier	Aug. 5	97	24·0	50·6	
Mariout	July 19	80	28·5	49·7	
Junior	July 18	79	25·5	43·9	
Himalayan	July 19	80	27·0	37·0	
Bearer	Aug. 4	96	24·0	35·0	
Chinese	July 29	90	28·0	34·7	
Duckbill	Aug. 6	98	22·5	33·5	
Feeder	July 29	81	35·0	24·1	

This year's results, as seen from the above table, are considerably higher than the average results for the past eight years. Bark's, a six-rowed variety, is leading not only for the year but also for the eight-year period. It is, however, one of the latest varieties in maturing. Cape and Swedish Chevalier, although not grown for eight consecutive years, have generally given very satisfactory results also, and have again proved high yielders. Feeder, a hooded variety, and one of the earliest tested, was grown this year for the second time. Both years it has proved rather inferior for this district, chiefly on account of its tendency to shatter.

PEAS

Seven varieties of peas were grown this season in one-sixtieth acre plots for comparative purposes. These were seeded April 30. The two varieties, Chancellor and Golden Vine, in which the pea was very small, were planted at 90 pounds per acre, while the rate for the other five was 150 pounds. A good stand was obtained in all cases, but all plots were damaged considerably by wet weather before threshing.

PEAS—TEST OF VARIETIES (DRY LAND)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Solo	Aug. 21	113	30	21·7	14·5
English Grey	Aug. 23	115	34	17·4	12·3
MacKay	Aug. 23	115	30	22·4	11·7
Prussian Blue	Aug. 22	114	29	17·9	11·7
Golden Vine	Aug. 23	115	27	22·5	10·8
Chancellor	Aug. 17	109	24	14·0	10·3
Cartier	Aug. 21	113	30	20·3	

FLAX

Four varieties of flax were seeded May 19, at 30 pounds per acre.

FLAX—TEST OF VARIETIES (DRY LAND)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Novelty	Aug. 20	93	24	9·3	5·1
Longstem	Aug. 20	93	23	10·6	4·3
Common	Aug. 20	93	21	12·0	4·2
Premost	Aug. 17	90	24	12·1	

Three of these varieties have been grown for eight years, and it will be noticed that the yields obtained this year are much higher than those obtained during this period. The standing of the varieties for the eight-year period is reversed in this year's results, although these varieties do not show much variation in yield at any time.

BEANS

During recent years a limited number of farmers in southern Alberta have become interested in the growing of beans. Two chief reasons for this are, that there is always a good home market for this product, and that beans, although not tested to any appreciable extent thus far, appear very promising from the standpoint of a summer-fallow substitute. In the few cases where they have been grown, the crop return from them has been the prime consideration, rather than their ability to serve as a summer-fallow substitute. However, the fact that they absorb only a small quantity of water from the soil and permit of cleaning the land as readily as do most of the hoed crops, the two chief purposes of summer-fallowing, makes them a crop well worthy of experimentation.

The local market demand is for the small white type of bean, and this demand is being met at the present time largely by importations from the

Western States and the Orient. Unfortunately the earliest ripening varieties tested at the Station are unsuitable both as regards colour and size to meet this demand satisfactorily.

As most varieties of beans require a fairly long growing season, the late spring and early fall frosts of this district may prove disastrous if the crop is not seeded at such a time that the entire growing season may be utilized. Efforts should therefore be made to develop the earlier ripening varieties of the desirable type and eventually bring about seed which is fully acclimatized.

Eighteen varieties of beans were tested this season. These were seeded on May 9, with a corn-planter in rows three feet apart and 72.6 feet long, two rows of each variety constituting a plot one one-hundredth acre in size. A duplicate planting was made ten days later. The following table shows most of the essential details concerning these varieties. Only the plot seeded earliest is considered under date of seeding, date of ripening and number of days maturing, while the yield per acre is the average yield of the two plots.

BEANS—TEST OF VARIETIES (DRY LAND) 1925

Variety	Date of seeding	Date of ripening	Number of days maturing	Colour of bean	Size of bean	Yield per acre
						bushels
*Michigan Early Wonder	May 9	Aug. 22	105	White	Small	15·70
Australian Brown	May 9	Aug. 23	106	Brown	Large	13·96
*Luther Burbank	May 9	Aug. 25	108	White	Small	13·54
*Imperial Pea Bean	May 9	Aug. 26	109	White	Small	11·98
*Kotenashi	May 9	Aug. 29	112	White	Small	11·50
Cranberry	May 9	Aug. 19	102	White with red spots and stripes	Large	11·46
Bayo	May 9	Aug. 18	101	White with purple spots and stripes	Large	11·41
*Robust Pea Bean	May 9	Aug. 27	110	White	Small	10·99
Norwegian	May 9	Aug. 22	105	Brown	Large	10·23
*Meyer	May 9	Aug. 25	108	White	Small	10·00
*Beauty	May 9	Aug. 25	98	White with brownish spots	Medium	9·70
*Great Northern	May 9	Sept. 3	117	White	Medium	9·43
Large White	May 9	Aug. 28	111	White	Large	9·06
Yellow six weeks	May 9	Aug. 18	101	Yellow	Large	8·34
Navy	May 9	Aug. 26	109	White	Medium	7·55
Quito	May 9	Aug. 27	110	White with brown spots and stripes	Large	5·90
Red Kidney	May 9	Aug. 27	110	Red	Large	5·84
*Lady Washington	May 9	Sept. 3	117	White	Small	3·86

*Varieties most recommended for the district.

A great deal of reliance should not be attached to the order in which these varieties appear in the table as based upon the yield per acre, as one year's results provide insufficient data upon which to arrange them in any definite standing. The varieties which, on taking all factors into consideration, appear most suitable to growers in the district at the present time are marked with a star.

ROD-ROW TESTING OF CEREALS (DRY LAND)

The rod-row method of testing cereals was carried out this year for the second time. A few improvements were made in the arrangement of this work which provided conditions more closely resembling field conditions, and so rendered the results more accurate. This method consists in testing out the different varieties in plots made up of three rows. The rows are eighteen and a half feet long and seven inches apart. Between the plots, just the ordinary row space (seven inches) is allowed. Seeding was done with a Planet Junior. At harvest time one foot was removed from each end of the plots to eliminate the border effect, leaving the rows one rod in length. The two outside rows of

each plot were discarded and the yields were determined from the centre rows. Quadruplicate plots of each variety were planted. This method of testing necessitates very careful methods of handling, but when so done, the results obtained should be as accurate, if not more so, than when larger plots are used.

This season twenty-eight varieties of wheat, sixteen of oats and fourteen of barley were tested in these plots. These follow in their respective order, arranged as to yield, for the season of 1925:—

Wheat: Ruby, Crown, Early Red Fife, Marquis, McKay, Supreme, Marquis McD. 114, Prelude Ottawa 135, Early Triumph, Kota, Huron Ottawa 3, Reward, Duchess, Garnet, Marquis 10B, Marquis Ottawa 15, Brownie, Marquis Sask. 7, Producer, Criddle's Selection, Golden, Master, Ceres, Acme, No. 1656, U. of A. No. 222, Kitchener, Renfrew, Kubanka.

Oats: Longfellow, Irish Victor P, Kherson, O.A.C. 72, Alaska, Columbian. Gold Rain, Danish Island, Gerlach, Victory, Banner Ottawa 49, Leader, Legacy Ottawa 678, Prolific Ottawa 77, Leader B., Leader A.

Barley: Himalayan Ottawa 59, Junior, Albert, Swedish Chevalier, Hannchen, Early Chevalier, Feeder Ottawa 561, O.A.C. 21 (Sask. Sel.), O.A.C. 21, Gold, Chinese Ottawa 60, Bearer Ottawa 475, Charlottetown No. 80, Duckbill Ottawa 57.

IRRIGATED LAND—VARIETY TESTS

As explained in connection with the testing of cereal varieties on dry land, a number of the older and better known varieties were tested in one-sixtieth acre plots, and these as well as several newer ones were also tested in rod-row plots. The land on which these tests were conducted was in hoed crops the previous season and was in very good condition at the time of seeding. One irrigation was given both rod-row and one-sixtieth acre plots on June 15. Irrigation in most seasons increases the yield of cereals 100 per cent or more, but grain does not ripen prematurely as is the case ordinarily on dry land.

Owing to the very unusually wet period which began the latter part of August and extended through September and October, when no threshing could be done, it was impossible to thresh the varieties on irrigated land before considerable damage was done.

WHEAT

Thirteen varieties of wheat were tested in one-sixtieth acre plots. The date of seeding was April 28, and the rate 90 pounds per acre.

WHEAT—TEST OF VARIETIES (IRRIGATED)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Red Bobs	Aug. 12	106	43·0	67·9	49·8
Marquis Ottawa 15	Aug. 10	104	42·5	65·9	49·4
Marquis (Chemist)	Aug. 11	105	40·0	62·0	46·5
Red Fife	Aug. 18	112	48·0	40·3	42·2
Ruby	Aug. 8	102	33·0	50·6	34·7
Marquis 10B	Aug. 12	106	40·0	77·1	
Early Triumph	Aug. 9	103	41·0	67·1	
Supreme	Aug. 11	105	41·5	65·4	
Kota	Aug. 18	112	47·5	62·5	
Reward	Aug. 10	104	42·5	59·2	
Garnet	Aug. 7	101	43·0	58·1	
Kitchener	Aug. 19	113	49·0	52·7	
Producer	Aug. 11	105	42·5	48·6	

Only five of the varieties grown this year have been grown for the past seven years. An examination of this year's results and the results of the seven-year period, shows the Marquis strains to be still in the lead. Two of them stand high in the average results for past years, while a third, Marquis 10B, which has not been grown for the past seven years, is the leading variety this year.

OATS

The same eight varieties of oats which were grown on dry land in the larger-sized plots were also grown under irrigation in one-sixtieth acre plots. Seeding was done April 28, and the rate was 102 pounds per acre.

OATS—TEST OF VARIETIES (IRRIGATED)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Danish Island	Aug. 3	97·0	48·0	115·7	104·1
Banner	Aug. 2	96·0	44·0	130·6	98·3
Gold Rain	Aug. 2	96·5	42·5	109·4	93·1
Longfellow	Aug. 1	95·0	48·0	108·1	
Victory	Aug. 4	98·0	42·0	96·2	
Leader			51·0	94·9	
Laurel	Aug. 3	97·0	44·5	68·8	
Alaska	July 25	88·0	33·0	46·8	

Three of these have been under test for eight years and of these Danish Island has proved the heaviest yielder. Banner, however, is somewhat stronger in the straw, and in wet seasons or on land which for any reason receives an excessive irrigation, will be less inclined to lodge. On taking all points into consideration, it appears to be the one which is most to be recommended. Laurel is a hulless variety with no special commercial value established, and while not as heavy a yielder as most of the others, it is a very desirable one where such a class of oat is required. Alaska is decidedly the earliest variety tested, and was grown this year for the second time. Both years it has proved a low yielder here.

BARLEY

Comparative tests were made of fourteen varieties of barley in one-sixtieth acre plots. These were seeded April 28, at the rate of 96 pounds per acre. Six of these varieties have been grown for a period of eight years and their average for that length of time is included in the table following.

BARLEY—TEST OF VARIETIES (IRRIGATED)

Variety	Date of ripening	Number of days maturing	Length of straw	Yield per acre	Average yield per acre for past 8 years
			inches	bushels	bushels
Bark's	Aug. 18	112·0	34·0	66·3	89·7
Invincible	Aug. 18	121·0	38·0	72·1	70·4
Gold	Aug. 16	110·0	30·0	73·1	69·8
O. A. C. 21	Aug. 2	96·0	40·5	67·5	68·1
Odessa	Aug. 7	101·0	34·0	80·1	68·0
Early Chevalier	Aug. 1	95·0	36·5	72·8	57·0
Cape	Aug. 1	95·0	35·5	103·8	
Trebi	Aug. 3	97·0	30·0	102·7	
Junior	Aug. 2	96·0	31·5	102·2	
Mariout	Aug. 2	96·0	30·0	100·6	
Bearer	Aug. 7	101·0	40·0	98·4	
Himalayan	Aug. 3	97·0	29·5	97·0	
Duckbill	Aug. 7	101·0	37·0	83·4	
Swedish Chevalier	Aug. 18	112·0	35·0	66·3	

Bark's, although standing at the bottom of the list of the varieties tested this year, has still a substantial lead over all others tested for the eight-year period. Its low yield this year is no doubt due to the fact that it is one of the latest in maturing, and with the severe weather conditions at harvesting time this season it suffered more damage than most of the others before being harvested. The yield of Swedish Chevalier was also reduced considerably on that account, as in most seasons it is one of the high yielders. Junior and Himalayan, two hulless varieties, have just been grown for three years and are giving good results. Where varieties of this type are desired either of these should give satisfaction.

FLAX

Four varieties of flax were tested in one-sixtieth acre plots. Seeding was done May 10, at the rate of 45 pounds per acre.

FLAX—TEST OF VARIETIES (IRRIGATED)

Variety	Date of ripening	Number of days maturing	Yield per acre	Average yield per acre for past 8 years
			bushels	bushels
Novelty	Aug. 25....	107	33·2	24·9
Longstem	Aug. 25....	107	23·7	24·9
Common	Aug. 25....	107	26·5	23·9
Premost	Aug. 25....	107	27·4	

Three of the varieties have been grown for the past eight years, and their average yields for this period are very similar.

BEANS

Diversification of crops on irrigated land is considered the soundest practice for farmers to adopt to-day. The tendency on such farms is to arrange the operations in such a way that revenue is derived from as many sources as possible. Beans have, therefore, a place, as there is always a good local demand for them and they provide another source of income. They also fit in well with irrigation farming in that they do not require irrigating at the same time as many other crops do, are easily cultivated and leave the land in ideal condition for the crop following. Irrigation this year produced yields about three and a half times larger than those obtained on dry land.

This season has been probably more discouraging to the growing of beans than to any other crop. Conditions were ideal during the growing period and practically all varieties tested reached maturity, but harvesting had just commenced when adverse weather set in. Several of the varieties remained in the field from two to four weeks before they could be threshed, and naturally suffered damage during that time. A certain amount of loss occurred through shattering on account of the difficulty of harvesting the crop at the proper time.

Eighteen varieties of beans were tested under irrigation. As on dry land these were seeded with a corn-planter on May 8 in rows 3 feet apart and 72.6 feet long, two rows of each variety constituting a plot 1/100-acre in size. A duplicate planting was made May 16. In the table following, the date of seeding, date of ripening, and number of days maturing are taken from the first seeding only, and the yield per acre is the average yield of the two plots of each variety.

BEANS—TEST OF VARIETIES (IRRIGATED) 1925

Variety	Date of seeding	Date of ripening	Number of days maturity	Colour of bean	Size of bean	Yield per acre	Yield per acre
						bushels	pounds
*Luther Burbank	May 8	Sept. 5	120	White	Small	46·10	2,765·6
Australian Brown	May 8	Sept. 12	127	Brown	Large	43·86	2,631·25
Bayo	May 8	Sept. 9	124	White with purple spots and stripes	Large	42·35	2,540·65
*Imperial Pea Bean	May 8	Sept. 8	123	White	Small	38·75	2,325·05
*Great Northern	May 8	Sept. 12	127	White	Medium	36·00	2,159·4
Quito	May 8	Sept. 9	124	White with brown spots and stripes	Large	35·63	2,137·5
*Michigan Early Wonder	May 8	Sept. 7	122	White	Small	35·57	2,134·4
Red Kidney	May 8	Sept. 12	127	Red	Large	34·38	2,062·5
*Lady Washington	May 8	Sept. 9	124	White	Small	34·17	2,050·0
Yellow Six Weeks	May 8	Sept. 5	120	Yellow	Large	32·50	1,950·05
*Robust Pea Bean	May 8	Sept. 12	127	White	Small	30·47	1,828·15
*Beauty	May 8	Sept. 6	121	White with brown spots	Medium	28·54	1,712·55
Cranberry	May 8	Sept. 12	127	White with red spots and stripes	Large	27·82	1,668·75
*Kotenashi	May 8	Sept. 7	122	White	Small	27·29	1,637·5
Norwegian	May 8	Sept. 9	124	Brown	Large	23·81	1,428·15
Large white	May 8	Sept. 12	127	White	Large	21·67	1,300·0
*Meyer	May 8	Sept. 12	127	White	Small	21·25	1,275·0
Navy	May 8	Sept. 4	119	White	Medium	20·37	1,221·9

*The most promising varieties.

Attention should be drawn here also to the fact that these yields are from only one year's results and the standing of these varieties cannot be considered as a permanent one. They are indicative, however, of the yields that may be expected from beans in an ordinary year.

The varieties which appear most promising, after considering other factors as well as yield, are in the table marked with a star.

ROD-ROW TESTING OF CEREALS (IRRIGATED)

Forty varieties of wheat, seventeen of oats, and seventeen of barley were tested in rod rows as explained in the section of this report dealing with cereals on dry land. The seeding of these was done by hand. They received one irrigation on June 15.

Probably the greatest difference seen this year from last in the growth and nature of different varieties was in their time of ripening. The warm dry weather of the early part of August hastened the ripening of all varieties to such an extent that it was extremely difficult to determine any difference in the time of ripening between varieties which generally show a difference in this respect of two or three days. A few of the varieties have just recently come into existence and are being tested under number rather than name.

The varieties of wheat, oats and barley tested this season follow in their order of yield:—

Wheat: Supreme, Marquis Ottawa 15, Marquis Sask. 7, Acme, Early Triumph, Renfrew, Criddle's selection, Kitchener, Marquis 10B, Marquis McKay, Kota, Ceres, Golden, Producer, Chelsea Ottawa 10, Reward Ottawa 928, Marquis McD. 114, 929B, Kubanka, No. 1656, Huron Ottawa, 3, U. of A. No. 222, Aurore, 929L6, Early Red Fife, 928 Q.Q.2, Brownie Ottawa 491, Garnet, Duchess, 928 P., Red Quality A., 928 WID., Ruby, Master, Crown, Parker's Selection, Quality, 939 D, 932 A, Prelude.

Oats: Leader, Columbian Ottawa No. 78, Danish Island, Prolific Ottawa No. 77, Kherson, Banner Ottawa 49, Victory, Gold Rain, Legacy Ottawa 678, O. A. C. 72, Longfellow, Irish Victor P, Leader A, Leader B, Alaska, Gerlach, Laurel.

Barley: Star, 910 H, Bearer Ottawa 475, Chinese Ottawa 60, O. A. C. 21, Gold, Junior, O. A. C. 21 (Sask. Sel.), Himalayan Ottawa 58, Hannchen, Charlottetown No. 80, Swedish Chevalier, Feeder Ottawa 561, Pearl, Albert, Early Chevalier, Duckbill Ottawa 57.

FORAGE CROPS

Good results were obtained from work done with corn, sunflowers, grasses and clovers, but in the root crops difficulty was experienced in some cases to get a satisfactory stand.

The moisture during the early part of the season was favourable to the growth and production of grass and clover crops on the dry land. The warm weather of July and August also favoured the production of corn and roots. The adverse weather of the fall, however, made harvesting operations during that period exceptionally difficult and the damage suffered by crops resulted in a considerable loss to the district. The rainy weather in the latter part of September did not permit of much harvesting of corn being done, and the twenty degrees of frost which occurred on the last of the month meant a decided depreciation in quality. With sugar beets and other root crops the difficulties were even greater. The same may be said of the second cutting of alfalfa. Not more than twenty-five per cent of the second crop had been cut and a considerable amount of this had not been stacked. Of the hay that had been put up, a certain proportion was damaged in the stack.

Since irrigation farming first came into practice in the district in 1901 such difficulties have not been experienced in connection with the last cutting of alfalfa.

CORN AND SUNFLOWERS

The past decade has apparently established corn among the important farm crops of southern Alberta. Previous to this period, corn was looked upon as a crop which required a longer growing season and more heat than this district ordinarily receives to warrant much attention being paid to it. During the past ten years, however, and in fact mostly during the past five years, corn has increased greatly in popularity, owing to the fact that in most parts of the district where it has been tried and given favourable conditions for growth very good results have been obtained.

Until two or three years ago corn was grown almost entirely for fodder and ensilage purposes. Now, however, with the development of corn-growing generally throughout the district has come the desire to ripen some of the earlier varieties and grow them to be pastured off by hogs and lambs. An effort is therefore being made by some to produce seed of the earlier ripening varieties, such as Quebec 28, Dakota White Flint, Gehu, North Western Dent, etc., not with the intention of making this a seed-corn producing district for the province, but rather for the sake of having these varieties become more acclimatized, so that better results may be achieved within the district. In the drier sections corn is being grown as not only the best form of summer-fallow substitute, but also as the crop which is most economical and dependable as a form of winter feed for live stock, while in the irrigated sections it is considered the most suitable roughage for adding succulence to rations for stock during the winter months.

Sunflowers also have been commonly grown throughout the district in recent years but are now becoming less popular, excepting in places where the season is usually too short or cool to grow a successful crop of fodder corn.

The season for corn was slightly more favourable than southern Alberta usually receives. The general impression is that it was much more favourable than it actually was, and that the same good results from corn as were obtained this year can seldom be expected. A study of the meteorological records of the Station, however, keeping in mind the fact that heat and moisture are the two most important factors towards producing corn successfully, shows conditions to resemble the average for the past twenty-two years very closely. "Monthly mean temperatures", "number of days with a temperature of 80° or higher", "precipitation per crop year" vary only slightly from the averages in each of these respects over the twenty-two-year period.

VARIETY TESTS OF CORN (DRY LAND)

Twenty-three varieties of corn were tested on dry land. These were seeded on summer-fallowed ground on May 9 in rows three feet apart and 72.6 feet long. Two such rows of each variety constituted a plot one one-hundredth-acre in size. All varieties were tested in duplicate and the yields given are the averages of the two plots. Harvesting was done September 22, when the plots were cut for ensilage purposes and the green weight taken immediately after cutting. The following table shows the standing of these varieties for this year and the average yield of these varieties which have been grown for a period of five years.

CORN—TEST OF VARIETIES, 1925 (DRY LAND)

Variety	Source	Height of plant	Maturity at harvest	Yield per acre green weight	Yield per acre dry matter	Percentage dry matter	Average green weight per acre 1921-1925
		ft. in.		Tons	Tons	p.c.	Tons
North Western Dent. Dakota grown	A. E. McKenzie	4 3	Dent	7·800	2·485	31·155	
North Western Dent.	Dak. Improved Seed Co.	5 5	Dent	8·375	2·240	26·855	
Hybrid	A. W. Wimple	5 2	Milk	8·675	2·220	26·76	
North Western Dent. Nebraska grown	A. E. McKenzie	4 7	Early Dough	8·73	2·13	24·315	9·59
Golden Glow	J. O. Duke	5 10	Milk	8·20	2·035	24·805	
Leaming	J. O. Duke	5 4·5	Milk	8·90	2·02	22·66	
Longfellow	J. O. Duke	5 3·5	Milk	9·035	1·88	21·68	
Compton's Early	J. O. Duke	5 4	Milk	9·46	1·82	19·33	9·46
Burr Leaming	Geo. S. Carter	6 2	Silking	7·985	1·805	22·655	
Dakota White Flint	M. L. Freng	4 1	Ripe	6·50	1·765	26·955	
North Western Dent.	Brandon Experimental Farm	4 7	Dent	5·85	1·75	30·08	
Haney's Minnesota No. 13	M. L. Freng	5 5	Dent	7·325	1·705	23·24	
Bailey	J. O. Duke	5 5·5	Milk	9·225	1·70	18·46	
Quebec 28	J. L. Todd	4 5	Ripe	6·35	1·67	27·625	
Longfellow	Dak. Improved Seed Co.	4 11	Silking	7·20	1·625	23·735	9·27
North Dakota	Steel Briggs	5 2·5	Early Milk	7·45	1·55	21·385	8·35
North Western Dent.	M. L. Freng	4 5	Dent	5·85	1·535	26·37	
White Cap Yellow Dent	Steele Briggs	5 11	Milk	5·46	1·50	29·295	9·72
North Dakota White Flint	A. E. McKenzie	4 4	Ripe	4·90	1·455	30·08	
Twitchell's Pride	Fredericton Exp. Farm	5 1	Ripe	4·95	1·44	29·395	
Leaming	J. Parks	5 6·5	Milk	5·01	1·13	22·56	8·28
Wisconsin No. 7	J. O. Duke	5 8·5	Milk	5·41	1·115	21·29	
Wisconsin No.7	J. Parks	5 6	Silking	5·65	1·07	27·345	9·55

In this table it will be noticed that two of the five strains of North Western Dent are leading in yield per acre of dry matter, while a third one appears in fourth place; also that four of the five had reached the dent stage at the time of harvesting. Of the varieties tested to date, North Western Dent has given most satisfaction for ensilage purposes.

Four varieties were seeded at the same time for seed purposes and the yields per acre of shelled corn from them were as follows: Gehu 41.52 bushels; Twitchell's Pride 26.34 bushels; Howe's Alta Flint 25.36 bushels, and Quebec 28 6.70 bushels.

VARIETY TESTS OF CORN—IRRIGATED LAND

The same twenty-three varieties of corn tested on dry land were tested under irrigation. Planting was done on May 9 in rows three feet apart. The area of plots was 1/100 acre as explained in the section describing the dry-land planting. A duplicate planting was made one week after the original. All varieties received one irrigation on July 14. The following table shows the standing and yields of these varieties for this year and the average for five years of these which have been grown for that length of time.

CORN-TEST OF VARIETIES, 1925 (IRRIGATED LAND)

Variety	Source	Height of plant	Maturity at harvest	Yield per acre green weight	Yield per acre dry matter	Percentage dry matter	Average green weight per acre 1921-1925
		ft. in.		Tons	Tons	p.c.	Tons
Burr Leaming	Geo. S. Carter	10 5	Milk	23·72	5·035	21·19	
Longfellow	J. O. Duke	7 10½	Late dough	19·375	4·83	25·685	
North Western Dent. Nebraska grown	A. E. McKenzie	7 8	Milk	17·30	4·82	27·83	
North Western Dent.	Dakota Improved Seed Co.	7 5·5	Late dent	15·25	4·62	30·275	24·07
Bailey	J. O. Duke	8 4	Dent	17·01	4·485	26·37	
Longfellow	Dakota Improved Seed Co.	8 3·5	Milk	19·16	4·38	22·95	36·05
North Western Dent.	Brandon Experimental Farm	6 7	Ripe	11·575	4·38	35·74	
Golden Glow	J. O. Duke	8 4	Dent	15·35	4·335	28·22	
North Western Dent.	M. L. Freng	6 9	Ripe	12·25	4·245	34·67	
Leaming	J. Parks	8 6	Milk	19·785	4·23	19·34	
Compton's Early	J. O. Duke	7 9·5	Dough	19·975	4·16	20·90	33·53
North Dakota	Steel Briggs	7 10	Milk	21·275	4·13	19·435	31·50
Leaming	J. O. Duke	8 5	Milk	16·80	4·11	24·415	31·01
Hybrid	A. W. Wimple	7 11·5	Milk	17·36	4·01	23·145	
Haney's Minnesota No. 13	M. L. Freng	7 4·5	Ripe	15·30	4·005	26·17	
White Cap Yellow Dent	Steel Briggs	9 5	Dough	14·875	3·86	25·88	28·78
Wisconsin No. 7	J. Parks	7 8·5	Milk	17·61	3·745	21·095	30·33
Wisconsin No. 7	J. O. Dukes	7 6·5	Milk	16·10	3·52	23·44	
North Dakota White Flint	A. E. McKenzie	5 4·5	Ripe	11·625	3·455	29·685	
Dakota White Flint	M. L. Freng	5 4	Ripe	10·50	3·25	28·905	
North Western Dent. Dakota grown	A. E. McKenzie	6 1	Ripe	11·285	2·90	25·88	
Twitchell's Pride	Fredericton Experimental Farm	6 7	Ripe	11·675	2·56	22·07	
Quebec 28	J. L. Todd	7· 5	Ripe	9·355	2·405	25·88	

The variety leading the list, Burr Leaming, was probably the most immature of all when harvested, but it produced such a vigorous growth that it is leading in yield of both green and dry weight per acre. The North Western Dent strains stand high in the list on irrigated as well as dry land. A comparison of these strains illustrates the importance of using northern-grown seed. The

strain from Nebraska reached only the milk stage. While three of the other four strains from either the Northern States or Western Canada matured, and the fourth reached the late dent stage. The same relationship is observed in the table on dry-land results.

Five of the earlier varieties were planted May 9 to determine the amount of grain that could be produced. One-hundredth-acre plots were used. The rows were three feet apart and plants were thinned to approximately fourteen inches.

As there was a perfect stand on these small plots, the yields per acre were naturally higher than could be expected under ordinary field conditions. The ears were harvested September 23, and the yields per acre of shelled corn were as follows: North Dakota White Flint, 110.4 bushels; Gehu, 75.5 bushels; Twitchell's Pride, 65.0 bushels; Howe's Alta Flint, 49.6 bushels, and Quebec 28, 45.6 bushels.

POULTRY

The winter of 1924-1925 was one of the most severe on poultry of any experienced at the Station, so that the high winter production of eggs of the previous season was not quite equalled by the flock of Barred Plymouth Rocks kept at the Station. The preceding year two pullets went over the 300-egg mark while this year the highest production was 287. The average production, however, for the entire flock for the year was 199 eggs, or only two eggs less than the 1923-1924, which was the highest obtained at the Station. The vitality of the flock has been maintained while colour, size of body and size of eggs produced show improvement.

FEEDING

The winter feed used at the Station consists of equal parts wheat, crushed oats and cracked corn for a scratch, and a dry mash composed of equal parts bran, shorts, middlings or low-grade flour, corn meal, beef meal, one-half part ground oats and a little fine salt and charcoal. A small portion of the scratch is thrown in the litter each morning to induce exercise, and a liberal feed is given at night before the birds go to roost. The dry mash is kept before the birds in open hoppers at all times and a wet mash is fed at noon on each alternate day. No more of the wet mash is fed than is eagerly consumed in five minutes. Green feed in the form of alfalfa leaves and cabbage is given to the birds in liberal amounts and roots are provided as additional succulence.

BEST MONTH FOR HATCHING

For three years hatching has been carried on at the Station throughout the months of March and April and to the middle of May, the first hatch usually coming off about the first of March and the last about May 15.

The following table gives the percentage, fertility and the percentage fertile eggs hatched in each month for three years. The eggs used were all from Barred Rocks.

DATES FOR HATCHING

Month	Percentage of eggs fertile				Percentage of fertile eggs hatched			
	1923	1924	1925	Average	1923	1924	1925	Average
March	75·5	86·3	87·2	83·0	54·0	65·6	58·5	59·4
April	86·0	88·5	91·5	88·7	79·0	75·4	69·0	74·5
May	80·5	93·0	90·7	88·1	65·4	62·4	63·9	63·9

The fertility was slightly lower in March than in April and May and the hatching results in that month were decidedly inferior, especially when compared with the April hatches.

April has, so far, proved to be the best hatching month to obtain the maximum number of chicks from the eggs set and in previous experiments conducted at the Station, the highest egg production was secured from pullets hatched in that month (Annual Report, 1922).

SIRE'S INFLUENCE ON EGG COLOUR OF PROGENY

In this test, which was conducted for three years, an effort was made to determine if the hereditary characteristics of the sire had any influence on the colour of the shells of eggs laid by his daughters. The males used descended from several generations of dams that laid attractive brown eggs. The egg colour data presented here were secured this season and are in direct accord with preceding tests. For convenience the colour of the egg is indicated in the table by numbers, " 1 " representing a white egg, and " 12 " a dark-chocolate-brown with intervening numbers representing corresponding shades between these extremes. The shades of eggs laid by the sire's dam and grand-dams ranged from 8 to 11.

Dam's number	Colour of dam's eggs	Number of daughters tested	Colour of daughter's eggs
H27	2	2	8
H106	3	2	7 to 9
H130	3	4	7 to 9
D236	4	4	8 to 9
E300	4	6	8 to 9

From the results obtained it appears that egg colour is an inherited factor. Whether or not this is a simple Mendelian character with brown as dominant in the Barred Rock breed has not been determined here, but it has been quite definitely shown that in selecting males from strains laying dark-brown eggs that uniformly dark-brown eggs will be produced by the daughters. As uniformity of colour helps materially in the marketing of eggs, the selection of males from strains laying eggs of the desired tints would appear to be very important.

LOSS OF WEIGHT IN EGGS DURING INCUBATION

The eggs used in four incubators, three Buckeyes and one Bluebird, were weighed when put in the incubators and again in 7, 14 and 19 days for the purpose of noting the loss in weight of the eggs during the various stages of incubation. The relative humidity in the incubators was maintained at 45 per cent to 55 per cent during the period of the tests.

Name of Incubator	Loss of weight in Ounces per 100 eggs			Percentage of fertile eggs hatched
	1st to 7th day	8th to 14th day	14th to 19th day	
Buckeye	6·3	10·0	9·6	61·0
Buckeye	7·5	9·6	8·8	62·5
*Buckeye	12·0	16·5	.....	57·0
Bluebird	9·2	7·5	.....	64·0

*Large incubator.

BARLEY VS. CORN FOR LAYING PULLETS

An experiment was started in 1924 to test the relative values of corn and barley as ingredients in the scratch-feed and mash fed to pullets, the object being to find a cheap home-grown feed that could be substituted for the more expensive imported corn which is now so extensively used regardless of price.

In some previous feeding tests the pullets were not put on the experimental rations until placed in the laying-pens and they did not take readily to new feeds introduced. To overcome this difficulty the chicks were divided into two separate lots when put on range at nine weeks of age. One lot was given the usual growing ration containing corn, and the other, a similar ration except that the corn was replaced with barley.

In the fall fifty pullets of each lot were selected and moved into winter quarters. The laying-ration of the corn-fed pen for the winter consisted of one part of cracked corn, one part crushed oats and two parts wheat as scratch-feed and equal parts bran, shorts, middlings, oat-chop, meat meal and corn meal as a dry mash. A little salt and charcoal was added to the mash. The barley-fed pens received a similar ration except that the corn was replaced with barley in both the scratch-feed and mash. In the summer three to four parts of wheat was used in the scratch instead of two parts as in winter. Both pens had access to alfalfa runs in the fall, spring and summer and in the winter were given liberal amounts of cabbage, alfalfa leaves and mangels. Only water was given to drink.

The results of the test were greatly in favour of the corn-fed lot both in egg production and vitality of the birds. The average egg production in the pullet year was 201 eggs for the corn-fed pen and 174 eggs for those receiving barley, and while the corn ration was higher in price, the feed cost per dozen eggs was 3 per cent less where corn was fed.

The most noticeable difference in the results from the two feeds was the high mortality in the barley-fed pen, where 23 of the pullets, or 46 per cent, died between February 17 and October 1, as compared to nine deaths, or 18 per cent, in the corn-fed pen. All the deaths of the birds receiving barley appeared to have been due to digestive troubles. The cause of the condition resulting in the deaths has not been determined so far, but the experiment is being continued with some variations in an endeavour to obtain more information on this problem.

It is interesting to note in passing that the first death occurred on February 17, or eight months after the birds were placed on barley feeds, so if the cause of death was nutritional, it took that length of time for the accumulative effect to be sufficient to be fatal on the weakest specimen. Many of the feeding experiments undertaken with laying pullets are conducted during the winter only or for a period of five or six months, and while the effects on egg production may undoubtedly be noted in that length of time fatalities may not occur that would be encountered if the same feeding practice were continued for a greater part of the lifetime of the bird.

RELATION OF HUMIDITY OF INCUBATOR AIR TO HATCHING RESULTS

An experiment was started in February 1923 for the purpose of studying the effects of various percentages of relative humidity of air in the incubator on hatching results. The data obtained in 1923 and 1924 were given in the reports of this Station for those years and the entire experiment has been treated fully in a separate publication (Circular No. 42, "Improving Incubation by Increasing Humidity"), so that only a brief statement of results will be given here.

The best hatches were obtained when the relative humidity of the incubator air was kept between 50 per cent and 60 per cent, only one half as many eggs

having ben required to procure a live chick at that humidity as was required when the humidity was at 35 per cent.

It was not found possible to secure sufficient humidity in the incubators by means of moisture pans or moist sand under the egg-trays but the moisture desired was easily obtained by hanging a moistened pad under the roof of the incubator near the radiator pipes. The pad used was made by wrapping burlap around a piece of shingle until a pad was formed about one inch thick, four inches wide and six inches long.

To get the desired moisture this pad was hung in the incubator on the first day and left until the 14th having been taken out and moistened whenever the eggs were turned. From the 14th to the 19th day no moisture was added and then the pad was replaced and left until hatching was completed.

SIXTH ALBERTA EGG-LAYING CONTEST

The severe winter of 1924-1925 materially decreased the production in the sixth Alberta Egg-Laying Contest conducted at the Station, for while the birds entered appeared to be equal to those of the preceding year the average production per bird dropped from 178.2 to 164.7 eggs, the leading pen from 2,482 to 2,124 eggs, and the leading bird from 305 to 287 eggs. As a complete report of the contest is made in the Annual Report of the Canadian National Egg-Laying Contests only a summary is given here.

LEADING PENS OF TEN BIRDS

Breed	Owner	Address	Production
1. Barred Rock	F. Edwards	Edmonton, Alta	2,124
2. S. C. White Leghorn	University of B.C.	Vancouver, B.C.	2,120
3. S. C. White Leghorn	Mrs. J. S. Cookson	Tofield, Alta.	2,081
4. S. C. White Leghorn	F. Lote	Hillcrest, Alta.	2,040
5. Barred Rock	Experimental Station	Lethbridge, Alta.	2,038

LEADING BIRDS

1. Barred Rock	Experimental Station	Lethbridge, Alta.	287
2. S. C. White Leghorn	University of B.C.	Vancouver, B.C.	283
3. Barred Rock	Experimental Station	Lethbridge, Alta.	276
4. S. C. White Leghorn	F. Lote	Hillcrest, Alta.	271
5. S. C. White Leghorn	F. Lote	Hillcrest, Alta.	262

SUMMARY OF BREEDS

Breed	Number of birds	Total eggs laid	Average per bird
1. White Leghorn	120	20,864	173·9
2. Barred Rock	120	20,326	169·4
3. White Wyandotte	40	5,751	143·8
4. Ancona	10	1,234	123·4
5. Partridge Rock	10	1,225	122·5
All breeds	300	49,400	164·7
1. Light breeds	130	22,098	170·0
2. Heavy breeds	170	27,302	160·6

All birds entered in the contest that showed no standard disqualifications and laid 200 eggs averaging 24 ounces per dozen were registered in the Canadian Live Stock Records. Thirty birds in all or just one-tenth of those entered in the contest qualified for registration.

BIRDS REGISTERED IN 1925

Name and Address of Breeder	Breed	Number of birds registered	Average production	Average egg-weight ounces per doz.
Mrs. J. W. Cookson, Tofield, Alta.	S.C.W.L.	1	210	24·0
University of B.C., Vancouver, B.C.	S.C.W.L.	3	230	25·0
G. M. Cormie, Edmonton, Alta.	S.C.W.L.	3	218	25·5
Pioneer Poultry Farm, Medicine Hat, Alta.	S.C.W.L.	1	212	24·5
Lily White Poultry Farm, Raymond, Alta.	S.C.W.L.	1	208	24·5
Mrs. C. D. Mylius, Edmonton, Alta.	S.C.W.L.	3	231	24·5
Poplar Hill P. Farm, De Winton, Alta.	R.C.W.L.	1	209	24·0
R. L. Rash, Purple Springs, Alta.	B.R.	1	255	24·1
W. A. Fraser, Medicine Hat, Alta.	B.R.	3	218	24·0
Dept. of Agriculture, Edmonton, Alta.	W.W.	1	232	24·5
F. Edwards, Edmonton, Alta.	B.R.	2	215	24·9
T. Hutchinson, Taber, Alta.	B.R.	2	222	25·1
S. Coldwell, Pollockville, Alta.	B.R.	1	207	24·6
Experimental Station, Lethbridge	B.R.	7	245	25·1

BEES

During the fall of 1924 and the winter of 1924-25, the apiary at the Station was moved to a new site, about one-quarter of a mile from the old location. Some of the colonies were moved at the time of the first cold spell in the fall, and packed and fed at that time on the new location, some were packed in floored cases and fed, and were moved during cold weather, and the remainder of the colonies were fed on their old stands, and were moved and then packed during cold weather in early winter. All colonies were moved with little disturbance, and no difference was noted in the after condition of any of the groups except that two colonies in single cases, not packed until the winter set in, failed to survive the winter.

Fifty-six single colonies and eight five-frame nuclei, placed two to a hive, were packed and fed in single, double and quadruple wintering cases. No colonies were put in the cellar, all being wintered outside.

SEASON OF 1925—WEATHER CONDITIONS AND HONEY FLOW

The winter of 1924-25 was a long severe one, with very little open weather so that bees were not producing brood quite as early as usual in the spring. All snow was gone by the first of April, and on the sixth of April the first willow buds were seen. Colonies on the whole seemed to be in good condition, being strong in bees and brood by the first of May. By May fourth, tulips, narcissus, dandelions and cotton wood were yielding a maintenance flow of pollen and nectar. A surplus of new nectar was observed in cells May 10, when dandelions were in full bloom. Plums, caragana, apple, dandelion and honeysuckle kept the bees feeding until the first white Dutch clover bloom was seen on May 28. White Dutch clover may have given a light flow the first week of June, but showers and wind kept the bees at home. At this period, and up to the fifteenth of the month, there was a marked decrease in numbers of bees in the colonies, so that some uniting was done. These conditions were no doubt caused by bees hurrying forth in their endeavour to gather nectar when they were caught by the cool wind and showers and perished.

The first gain made by the colony on scales was recorded June 15, during a period of very hot weather which continued, broken by a few showers, to the end of the month. The highest daily gain in June was four pounds. The honey was very clear and apparently was obtained from white Dutch, and a little from sweet clover. The month closed calm and hot.

The first heavy honey flow began about July 1, when sweet clover, white Dutch and alsike clover followed about the fifth of the month by alfalfa, began secreting nectar in quantity. Up to the tenth of the month the weather was broken by cloudy days, showers and wind, holding the bees back. On July 8 the first cutting of alfalfa was begun. Weather conditions until the end of the month were for the most part favourable. The highest daily yield for this year for one colony was 18 pounds made on July 27 and gathered principally from sweet clover, white Dutch, clover and alfalfa. Until August 9 there was a continuation of this flow which was then broken by cool rains and winds, just as the second crop of alfalfa was coming into bloom, and continued until the eighteenth of the month. A period of warm weather and a light flow followed to the end of the month. Cold winds and rains began with September and continued through the month until the first frost, six and one-half degrees on September 20, cut off all hopes of obtaining the abundant crop promised by early May conditions. It was interesting to note that on September 13 and 14 during a four-day period of hot weather between rains, the colonies on the scales made a gain of seven pounds on one day and nine pounds on the other day. This indicates that had other conditions been favourable, the bees were ready and willing, and that the nectar was there ready and waiting to be gathered from the last alfalfa crop, but for good honey production the ideal days with a wide range of temperature which we usually expect during August and early September were scarce.

Brood rearing had practically ceased by September 15 and during the sudden cold weather, many bees perished in the top honey supers. Many small colonies that in ordinary years would have reared brood until well into October were stopped early in September and had to be united with others. However, after uniting, feeding and packing, bees went into winter well supplied with honey stores at least. The cold weather did not allow feeding as much sugar syrup as was desired, yet the colonies were fed an average of ten pounds of sugar and all colonies were well up to standard weight.

The average production of honey per colony spring count, for colonies run for honey production only was 124.8 pounds. For the entire apiary the production was: ten-frame Jumbo, 95.3 pounds, and ten-frame Langstroth, 93.9 pounds. An increase to the apiary of twenty-five colonies over spring count was also made. Seventy-one colonies and ten five-frame nuclei are packed and fed for winter of 1925-26. Feeding and packing were completed on November 11.

EXPERIMENTAL WORK WITH BEES

The experimental tests carried on in the Farm Apiary last year were continued with the addition of eight new projects.

SWARM CONTROL

Two methods of swarm control were tried and the effect of each on the control of swarming and on honey production noted.

SWARM CONTROL BY DEQUEENING AND REQUEENING.—All colonies were carefully watched for swarming tendencies and five of such were selected and treated in the following manner. As soon as larvæ were observed in the queen-cells (eggs not considered) the queen was removed, and all queen-cells were destroyed. Nine days later all queen-cells were again destroyed and a young laying queen given to the colony. No more preparations for swarming were made by colonies so treated, and an average per colony of 81.4 pounds of honey was produced.

SWARM CONTROL BY SEPARATION OF QUEEN AND BROOD.—Five other colonies that showed preparation for swarming by having larvæ in queen-cells had the combs containing brood removed from the brood-chamber, and replaced with

empty drawn combs, leaving the queen on these combs. The bees from one of the combs of brood were shaken down with the queen and a queen-excluder placed over this chamber. All combs of brood were then placed in a super and put on top of the hive above the extracting supers with a queen-excluder between the extracting supers and the one containing brood. The queen-cells in the upper super were not destroyed, but the cover was left tight so that no virgin queen could fly. No more preparations for swarming were made in these five colonies. Two of them had the cells destroyed and three had virgins perish after emerging. An average per colony of 98.2 pounds of honey was produced.

METHODS FOR DETECTING PREPARATIONS FOR SWARMING.—Nine colonies were selected for this test. As soon as the bees in the colonies showed signs of congestion in the spring, a shallow super with drawn comb was added to the regular brood-chamber without a queen-excluder. At the regular examination of the colonies (every nine or ten days) the shallow super was tipped from the rear and it was noted if the queen-cells were present along the lower edges of the combs in the shallow super. If such queen-cells containing larvæ were present the colony was treated by one of the methods for swarm control. If no queen-cells were present above, all combs in the lower chamber were examined and if any were found there, they were not destroyed, but the position they occupied on the comb was carefully noted, as such cells may have been supersedure cells. Of the nine colonies given shallow supers, three made no preparations for swarming. One made larvæ in queen-cells in centre of bottom combs and this queen was superseded. One made larvæ in queen-cells in centre of shallow combs and superseded their queen, and four had cells on bottom of combs in shallow super and were treated for swarm control. No swarms issued.

WINTERING IN ONE-, TWO- OR FOUR-COLONY CASES

It would appear that colonies of bees can be kept satisfactorily in this district in any of these types of wintering cases provided they are properly insulated and have adequate food stores for the winter. The only difference is that the four-colony case costs less per colony, and calls for less labour than either the one-colony or the two-colony cases. The four colonies packed together doubtless help to keep each other warm. For comparison of cellar wintering and outside wintering, see the annual report of this Station for 1922, page 72, and for 1923, page 40.

WINTERING SURPLUS QUEENS

Eight colonies having five or less combs covered with bees were noted at the latter end of September and used as nuclei for the wintering of surplus queens. In four of these weak colonies five empty combs were removed and the five combs containing bees and brood were placed to one side of the brood-chamber and a bee-tight division board fitted in. The following day the five combs containing bees in the other four weak colonies were transferred to the vacant sides in the first group so that two weak colonies were brought together in one hive. Two entrances were provided and each part was fed sugar syrup. In the spring six of the eight queens were alive and laying. Ten of these nuclei are being carried through the winter of 1925-26 by this method.

JUMBO VS. LANGSTROTH BROOD-CHAMBER

For two years a comparison has been made of the returns from ten-frame Jumbo and ten-frame Langstroth brood-chambers. In the year 1924 the Jumbos had a decided gain over the ten-frame Langstroth, making an average value of honey and increase produced of $29.40 against the ten-frame Langstroth's $16.70. In the year 1925, a much better honey year, six colonies were compared. The Jumbo hives averaged $24.98 and the Standard ten-frame Langstroth hives $25.43. Very little swarming was experienced.

QUEEN REARING

Queen rearing was carried on in an attempt to produce queens and bees with greater disease resistance, reduce swarming instinct and to better the strain in general. Wooden queen-cells primed with royal jelly having young larvæ or eggs transferred to them were given to queenless colonies. After cells were accepted, drawn out and capped, they were transferred, one each to hatching and mating boxes. After mating, and when laying, the young queens were introduced to queenless colonies or disposed of otherwise. The results for 1924 were: no cells accepted where eggs were transferred. Where cells were primed with royal jelly and larvæ transferred, out of 222 larvæ transferred, 129 were accepted, 122 capped, 101 emerged, and 97 were mated and used. Results for the year 1925 were: for larvæ transferred in May, 69.2 per cent; in June, 86.6 per cent; in July, 77.7 per cent; and August, 89.7 per cent, or a percentage for the season of 78.5 queens from larvæ transferred. The comparatively light flow of nectar during the first of July appeared to have a bearing on the smaller number of cells accepted at that time.

SPRING MANAGEMENT OF WEAK COLONIES

Two methods of building up weak colonies in the spring were tried: (1) The Alexander method and (2) giving combs of emerging brood. The Alexander method consisted of removing the covers from a number of the strongest colonies and placing a queen-excluder on top. A like number of weak colonies were removed from their floor boards, first making sure they had some brood, and each were placed on top of a strong colony above the queen-excluder. About six weeks later when queens were laying well the top or weak colony was removed to a new location.

The introduction of emerging brood gave best results in 1925, with an average production of 104.25 pounds of honey, while the Alexander method produced 80.7 pounds per colony.

RETURNS FROM DIVIDED VS. UNDIVIDED HIVES

The relation between divided and undivided hives, it would appear, varies to a greater or lesser extent as the year varies in an abundant flow of honey or a lack of abundance of that flow. In 1924, a year of short honey flow, divided hives produced increase and honey to the value of $15.36 per colony, while those not divided averaged $15.96. In the following year (1925), there was a more abundant honey flow and the increase also produced some surplus honey which was lacking in the year before. Thus in the year 1925 the divided colonies produced honey and increase amounting to $23.74 against the not-divided-group production of $19.77 per colony. This comparison was made with some colonies divided June 15, and others at the time when colonies neded first honey supers. Honey was valued at 18 cents per pound and increase at $7 per colony.

DRAWN COMB VS. FOUNDATION FOR EXTRACTED HONEY PRODUCTION

Comparisons were made during the past two years of the value of giving colonies drawn comb against the giving of sheets of foundation for the production of extracted honey. In the year 1924 colonies working on drawn-out comb produced an average return per colony of $29.40, while those on sheets of foundation produced $11.85 per colony. Considering the loss in honey by having to draw out the sheets of foundation when compared with drawn comb, each standard comb cost the bees 73 cents in loss of honey produced in 1924. This year (1925) when nectar, pollen, and weather conditions were more favourable the colonies on drawn combs produced an average value of $18.20, while those on sheets of foundation produced $12.80. By keeping record of combs and sheets of foundation given, it was found that it cost 34 cents to produce a

shallow super frame; 48.6 cents for a standard; and 64.8 cents for Jumbo frame. This project shows clearly the value of drawn combs to the commercial beekeeper if much foundation has to be drawn out by the bees.

MAKING INCREASE

Tests were made to determine the time of season and the best method to use for making increase so as to satisfactorily control swarming and yet not interfere with the honey crop. Three methods were tried at three different periods in the season. (1) When the colony became ready for a super in the spring, most of capped brood and nurse-bees were taken away and a young laying queen introduced. (2) The first week in July when the first queen-cells were found containing larvæ, the queen and one frame of capped brood with adhering bees were taken away and all queen-cells destroyed. Nine days later all queen-cells were again destroyed in the parent colony and a young laying queen introduced. (3) A second brood-chamber of drawn combs without a queen-excluder was given when the colony was ready for a super in the spring. In the second week of the honey flow all capped brood was moved to the upper chamber, leaving the queen in the bottom chamber with all uncapped brood. This top chamber or increase was given a bottom board and cover. A young laying queen was introduced and was then placed alongside of the parent colony. In about a week the new colony was removed to another part of the apiary on a day when bees were flying so that worker bees would go into the hive on the old location. There were no swarms developed in any of the groups treated.

The table following shows the average results as found on the first of October, 1924 and 1925, of colonies treated by each of the above methods together with check colonies not divided:—

METHODS OF MAKING INCREASE

1924	Combs covered with bees	Weight of colony	Weight of honey produced	Value of honey produced	Value of honey and increase
		lb.	lb.	$	$
Colonies not increased	8·0	63·40	79·80	15·96	15·96
Increased Method 1	7·2	62·20	41·80	8·36	15·36
Increased Method 2	7·0	64·66	56·33	11·26	18·26
Increased Method 3	7·5	65·25	52·50	10·50	17·44
1925					
Colonies not increased	7·8	67·4	109·8	19·77	19·77
Increased Method 1	7·8	66·4	99·8	17·97	24·97
Increased Method 2	7·8	68·2	91·8	16·52	23·52
Increased Method 3	7·8	66·4	93·6	16·85	23·85

GENERAL NOTES

Exhibits dealing with horticulture and apiculture were featured at the horticultural shows at Lethbridge and Calgary and at the Lethbridge and Taber fairs. Similar exhibits with a poultry section added were taken to the fall fairs at Claresholm, Granum and Carmangay.

Excursions of farmers and their families were held at the Station under the auspices of the Taber Board of Trade, the Glenwoodville U.F.A., and the Lethbridge Northern Irrigation districts. A beekeeping field day was held at which most of the beekeepers of southern Alberta were present, four having made a special trip of 110 miles to attend. Each one had a bee veil and the time was spent in the apiary examining colonies under the direction of the Dominion Apiarist from Ottawa who led in the discussions.

The second Annual Short Course in irrigation farming, which has become known locally as the "College on the Farm," was held from February 2 to 7 inclusive. The Provincial Department of Agriculture co-operates with the Station in this activity and besides lectures given by members of that department and the Station staff, the Alberta University, the Canadian Sugar Factories, Ltd., and the Department of Natural Resources of the Canadian Pacific Railway assisted in furnishing speakers to deal with special subjects. The manager of the Prince of Wales' Ranch, High River, also gave a series of lectures that were greatly appreciated. The attendance throughout the six days of the course ranged from sixty to one hundred, a number of the farmers staying for the entire course.

The number of letters from farmers inquiring about their varied problems increases steadily from year to year.

OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1926.