DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT

W. H. FAIRFIELD, M.S.

FOR THE YEAR 1929

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DOMINION EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

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

The Lethbridge Station is surrounded by extensive dry land wheat farms, and also embraces in its territory about 400,000 acres of irrigated lands. This condition makes it necessary to conduct two types of experiments in field husbandry, cereals, forage crops, and horticulture; one to study problems peculiar to dry land, and one to investigate the factors affecting irrigation.

THE SEASON

Considering the conditions generally that prevailed on the prairies the Lethbridge district enjoyed a particularly favourable season. The spring of 1929 began in a most propitious manner so far as moisture was concerned. During April, May, and June, 8·9 inches of precipitation fell. Dry hot weather prevailed from June 17 to harvest time, with the result that although the district produced on the whole an excellent grain crop the yields were not as unusually abundant as early indications promised. The sugar beet crop, which is becoming a more important crop each year on the irrigated lands, was good. Ample moisture in the spring ensured good germination, so excellent stands were obtained in all cases. The hot summer was conducive to good growth, and the open fall facilitated harvesting operations. The high sugar content obtained was encouraging to both the growers and the factory. The yield of alfalfa hay produced in the district, though saved in excellent condition, was lighter than usual, due to the shortage of irrigation water in July and August.

METEOROLOGICAL RECORDS AT LETHBRIDGE, ALBERTA, 1929

Month	Temperature F.			Hours of bright sunshine	Wind			Evaporation from free water surface, summer	Precipitation	
	Highest	Lowest	Mean		Mean hourly velocity	Greatest mileage in one hour	Direction		1929	Average 27 years
	°	°	°		miles			in.	in.	in.
January	50	−45	5·4	100·9	8·6	39	SW	.....	1·08	0·66
February	42	−37	7·6	144·5	9·6	38	SW	.....	0·63	0·69
March	62	2	34·8	149·4	11·7	42	SW	.....	1·34	0·72
April	68	2	35·5	216·2	10·5	37	SW	.....	2·55	1·02
May	82	25	50·3	247·9	9·0	35	SW	3·07	2·63	2·49
June	82	38	58·1	279·8	9·4	36	SW	4·63	3·72	2·95
July	94	38	64·0	364·7	8·4	35	SW	7·89	0·52	1·85
Aug	97	40	65·7	337·8	7·5	31	SW	5·54	0·59	1·72
September	91	23	48·9	192·6	5·9	27	SW	3·19	2·05	1·77
October	77	17	46·6	201·5	11·0	31	SW	3·63	2·20	0·88
November	63	−17	32·8	116·2	13·1	43	SW	.....	0·49	0·65
December	56	−26	13·8	87·6	12·4	47	SW	.....	1·91	0·67
Total	.....	.....	.....	.....	.....	.....	.....	.....	19·71	16·06
Average	.....	.....	38·6	203·3	9·7	.....	.....	*4·66	.....	.....

*6 months average.

Last spring frost occurred on May 18, when 32° above was registered. Last killing Spring frost May 7 with temperature of 26°F.

First fall frost September 6, registered 28°F. and first killing frost occurred on Sept. 28 registering 24°F.

LETHBRIDGE MONTHLY PRECIPITATION FIGURES FOR 28 YEARS

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Year
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	
1902...	0·67	1·03	0·48	0·02	11·27	5·69	5·95	0·69	0·84	0·02	0·43	0·84	27·93	1902
1903...	0·62	0·79	0·89	0·33	2·95	1·12	1·86	3·21	1·60	0·17	0·58	0·70	14·82	1903
1904...	0·50	0·90	1·03	0·41	2·86	1·80	0·96	1·19	0·52	0·85	0·03	0·35	11·40	1904
1905...	1·45	0·05	0·74	0·56	1·33	2·68	1·44	1·99	0·80	1·13	1·36	0·25	13·78	1905
1906...	0·22	0·20	0·54	1·30	8·60	2·31	0·83	4·70	0·16	1·93	0·81	0·88	22·48	1906
1907...	1·52	0·30	0·34	1·08	1·14	3·64	1·43	2·30	3·24	0·05	0·14	0·32	15·50	1907
1908...	0·27	0·75	1·10	0·67	2·78	7·64	0·41	0·89	0·73	1·16	0·02	0·25	16·67	1908
1909...	0·49	0·28	0·37	1·51	4·27	0·62	1·98	0·21	0·49	0·40	0·53	0·54	11·69	1909
1910...	0·24	0·83	0·17	0·28	0·79	0·53	0·09	1·07	2·01	0·59	0·41	0·94	7·95	1910
1911...	0·70	0·52	0·32	0·82	1·90	4·69	2·27	3·63	4·16	0·57	0·95	0·77	21·30	1911
1912...	0·69	0·40	0·44	0·20	0·66	1·73	2·78	1·41	2·61	1·07	0·99	0·23	13·31	1912
1913...	0·80	0·30	0·42	0·52	1·70	4·70	1·29	1·93	1·65	0·50	0·36	nil	14·17	1913
1914...	1·55	0·96	1·12	0·54	0·29	2·48	0·93	3·59	1·07	2·17	0·63	1·19	16·52	1914
1915...	0·50	0·94	0·22	0·04	3·03	4·84	3·44	0·96	1·32	0·96	0·75	0·27	17·27	1915
1916...	1·09	0·86	0·90	0·46	3·77	3·54	3·33	2·97	4·66	1·99	0·49	0·51	24·57	1916
1917...	0·73	0·27	0·10	1·57	0·95	1·42	1·37	2·00	1·67	0·82	nil	1·13	12·03	1917
1918...	0·46	0·76	0·66	0·13	0·58	0·75	0·85	1·23	1·07	0·24	0·43	0·46	7·62	1918
1919...	0·06	0·95	0·75	0·47	1·75	0·56	1·06	1·05	2·04	1·78	1·26	0·55	12·28	1919
1920...	0·84	1·21	0·89	4·37	1·66	0·40	2·59	0·20	0·05	0·99	0·06	0·79	14·05	1920
1921...	0·56	0·47	1·42	1·19	0·96	1·04	3·23	0·46	1·29	0·23	1·73	0·19	12·77	1921
1922...	0·43	0·41	0·81	2·57	0·89	1·87	2·30	0·40	0·81	0·78	0·47	0·60	12·34	1922
1923...	0·48	0·42	0·75	1·09	3·48	4·45	2·55	1·01	0·18	0·55	0·53	0·91	16·40	1923
1924...	0·66	1·04	0·69	0·56	1·17	3·82	0·54	2·91	1·46	0·59	1·02	1·54	16·00	1924
1925...	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	1925
1926...	0·24	0·76	0·11	0·34	0·64	4·67	1·15	2·31	4·62	0·31	0·52	0·56	16·23	1926
1927...	0·31	1·39	0·37	1·48	7·32	1·60	1·93	1·74	3·29	0·58	2·88	0·96	23·85	1927
1928...	0·94	0·79	0·93	1·32	0·09	6·79	3·98	1·54	0·24	0·85	0·28	0·33	18·08	1928
1929...	1·08	0·63	1·34	2·55	2·63	3·72	0·52	0·59	2·05	2·30	0·49	1·91	19·71	1929

The greatest total annual precipitation was 27·93 inches in 1902, the greatest for one month, 11·28 inches in May, 1902, and the greatest for one day, 2·92 inches on June 6, 1908.

ANIMAL HUSBANDRY*

HORSES

The number of horses on the Station is the same as in 1928, one aged Clydesdale mare having been disposed of, and one young mare purchased for light delivery work. There were no foals born during the year. The nine head of registered Percheron females are in good condition, and six of them are bred to foal in 1930.

EXPERIMENTAL WORK WITH HORSES

During the period January 17 to March 22, 1929 trials were carried out, with horses on heavy work, hauling gravel, comparing alfalfa with timothy hay for horse feeding.

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

HORSE FEEDING TRIAL, 1929. TIMOTHY HAY VS. ALFALFA HAY

Items	Timothy hay		Alfalfa hay	
	Group 1		Group 2	
Number of days of trial, Jan. 17 to Mar. 22, inclusive	65		65	
Number of horses	4		4	
Average age ..... years	10·75		12·75	
Total initial weight ..... lb.	6,553·2		6,291·5	
Average initial weight ..... "	1,638·3		1,572·9	
Total final weight ..... "	6,201·5		6,056·5	
Average final weight ..... "	1,550·4		1,514·1	
Average loss ..... "	87·9		58·8	
	Oats	Timothy hay	Oats	Alfalfa hay
Feed consumed				
Per day per group ..... lb.	59·0	73·5	54·0	69·8
Average per horse per day ..... "	14·75	18·38	13·50	17·44
Total for period ..... "	3,835·0	4,777·5	3,510·0	4,533·8
Cost of feed at 55 cents per bush. for oats, and $10 per ton for hay ..... $	62 04	23 89	56 78	22 67
Average feed cost per horse ..... $	15 51	5 97	14 20	5 67
	Group 1		Group 2	
Total feed cost per group ..... $	85 93		79 45	
Average feed cost per horse ..... $	21 48		19 86	
Cost of feed per horse per day ..... $	0 33		0 31	
Total working time during trial per group ..... hours	1,352		1,352	
Working time—				
Average per day per group ..... hours	20·8		20·8	
Average per day per horse ..... hours	5·2		5·2	

The plan of the experiment was to feed one horse of each team timothy and the other alfalfa hay. All horses were fed oats and hay in amounts prescribed by Henry and Morrison's feeding standards. Both groups lost weight during the trial, due possibly to their being unaccustomed to being rationed and also to the fact that they were at exceptionally heavy work. The average hours worked per day were lowered by the Sundays and a few days when it was too stormy to work. The group receiving timothy hay lost more weight than did the group receiving afalfa hay, and so far as could be observed the alfalfa group were at no disadvantage whatever from the feeding of a high protein roughage.

CATTLE

STEER FEEDING

Fifty-two head of steers were purchased at the Calgary Feeder and Stocker Show and Sale in October, 1928. They were run on the stubble fields until they had been subjected to the tuberculin test, and put in feeding corrals on December 9, 1928. The cost of grazing at 2·5 cents per day, and the value of some fodder provided while on feed, is added to the cost of feed lot.

Prior to commencing the feeding trials the steers were weighed individually on three consecutive days, the average of these weighings being taken as the initial weight.

The object of the trials was to obtain further information regarding the feasibility of fattening yearling cattle on the home grown feeds of Alberta's irrigation districts.

The following feeding projects were conducted:—

1. The value of boiled barley in finishing yearling cattle.
2. Standard grain rations of oats and barley.
3. The value of frozen wheat for fattening yearling cattle.
4. The value of brown hay in fattening yearling cattle.

The steers used were chiefly of Shorthorn and Aberdeen Angus breeding and were of fair quality. They were divided among the four groups as evenly as possible, keeping in mind breed, type and weight.

Groups one, two and three were fed first cutting alfalfa hay of excellent quality. Group four was fed "brown hay" (alfalfa hay which had been stacked the same day it was cut and which had gone through a process of fermentation in the stack).

Following is a table giving results of the fattening trials:—

STEER FEEDING TRIALS, 1928–1929, DECEMBER 9 TO MARCH 11

Items	Group 1, oats, barley, alfalfa hay, 2 pounds boiled barley daily	Group 2 oats, barley, alfalfa hay	Group 3 frozen wheat, alfalfa hay	Group 4 oats, barley, brown alfalfa hay
Number of steers in trial	13	13	13	13
Number of days in trial	92	92	92	92
Total initial weight lb.	9,946	9,948	10,105	9,827
Average initial weight "	765	765·2	77·3	755·9
Total final weight "	11,882	11,734	12,185	11,221
Average final weight "	914	902·6	937·3	863
Total gain for period "	1,936	1,786	2,080	1,394
Average gain per head "	148·9	137·4	160	107·2
Average gain per head per day "	1·62	1·49	1·74	1·17
Feeds consumed				
Alfalfa hay lb.	18,201	19,756	17,873	18,475
Oats "	3,354	3,354	2,145	3,354
Barley "	6,506	6,506	.....	6,506
Frozen wheat Ex. No. 1 feed "	.....	.....	7,696	.....
Boiled barley "	2,874	.....	.....	.....
Cost values				
Average buying cost per head at 8·48 cents per pound $	64 87	64 89	65 92	64 10
Feed Values				
Alfalfa hay at $9 per ton $	81 90	88 90	80 42	83 13
Oats at $33 per ton $	55 34	55 34	35 38	55 34
Barley at $27 per ton $	87 83	87 83	.....	87 83
Boiled barley at $27 per ton $	38 80	.....	.....	.....
Frozen wheat at $20 per ton $	.....	.....	76 96	.....
Salt at $30 per ton $	0 45	0 45	0 45	0 45
Average cost of feed per head $	20 33	17 89	14 86	17 44
Cost to produce one pound of gain $	0 37	0 130	0 093	0 163
Average cost of steer and feed $	85 20	82 78	80 78	81 54
Appraised selling prices per cwt. $	8 50	8 30	8 30	8 00
Average value per steer $	77 69	74 92	77 80	69 05
Loss per head $	7 51	7 86	2 98	12 49

It will be noticed that over the feeding trial period and using appraised values, which were based on prevailing market prices as the basis of computation, all groups showed a loss in the financial statement. The steers were held on feed for a further period and were actually sold for a very good profit. However, the appraised value reveals the spread in price due to finish showing group 1 fed a supplement of boiled barley to have a spread of twenty cents per hundred pounds greater than groups 2 and 3, due to a certain bloom which is coincident to the feeding of boiled barley. The lowest value was received for group 4 fed on " brown hay " with the same grain ration as group 2. The cattle in this group appeared to relish their roughage and there was less waste hay from this lot than any other but it did not promote gains nor thrift in the cattle, and their coats became quite rough. Groups 2 and 3 were about equal in finish.

It is evident that the economy of steer feeding is dependent upon two factors: firstly finish, with the resultant higher selling value, and secondly on the cost of the feed used for finishing. It will be seen from the table that the average cost of feeding a steer for the period in group 1 was $20.33, not including the cost of boiling the barley, while the feed cost per steer in group 3 was only $14.86 due to the fact that frozen wheat could be obtained at the unusually low price of one cent per pound in the fall of 1928. This resulted in a financial balance of $4.53 in favour of group 3 in spite of the better bloom of group 1. It is noteworthy that the cost of producing a pound of gain in the first three of these groups is lower than the average cost to produce one pound of gain at this Station over a period of years, and that the cost per pound gain of 9·3 cents in group 3 is a record for low cost of gain at this Station, the average cost over a period of fifteen years being 14·6 cents; the previous low record being 10 cents.

The following table giving feed required per pound of gain also total digestible nutriments and nutritive ratio, according to analysis by Henry and Morrison, will be found of interest. It would appear that feed wheat and alfalfa hay make a particularly well balanced combination in view of their efficiency in producing gains on a low feed requirement. This deduction is borne out to some extent by the results of feeding trials with wheat as a part of the grain ration in trials conducted in the years 1912-13, 1913-14, 1918-19 and 1921.

Feed Requirements for One Pound of Gain

—	Group 1	Group 2	Group 3	Group 4
Hay.....lb.	9·40	11·06	8·59	13·25
Oats..... "	1·73	1·88	1·03	2·41
Barley..... "	3·36	3·64	.....	4·67
Wheat..... "	.....	.....	3·70	.....
Boiled barley..... "	1·48	.....	.....	.....
Total digestible nutriments..... "	9·911	9·921	8·117	12·242
Nutritive ratio.....	1 : 5·2	1 : 4·9	1 : 5·0	1 : 4·9

It should be pointed out that a financial loss as is indicated in the feeding trial tables, is not necessarily an actual loss but means rather that a lower price than those at which the feed is being charged is being realized. It would be an actual loss only when the feeds used have an actual cash value on the farm of a price which will not be returned through the steers plus labour interest and other charges.

A final summary of the steer feeding operations reveal the following information:—

Fifty-two head of yearling steers were purchased at Calgary Feeder Sale, October, 1928.

Date of receipt, October 25, 1928—	
Cost F.O.B. Lethbridge	$ 3,292 29
Total feed cost	1,626 33
Total cost (feed and steers)	4,918 62
Net selling price April 11, 1929	5,150 86
Revenue over cost	232 24
Average profit per steer	4 47

Following is a concise summary of some feeding trials conducted at this Station since the war. All of these trials were conducted with two-year-old steers and under uniform conditions and may be considered suitable from a comparable standpoint.

It is thought that in view of the stimulus cattle feeding is receiving in this district as a result of the operation of the " Red Label Beef Feeders' Association," the following figures will be of value to beginners in the feeding business in that they will allow a reliable computation of the approximate amounts of various feeds necessary to produce a given desired amount of gain, and also the approximate feed cost of each pound of gain by applying prevailing feed values to the amounts given.

CONCISE SUMMARY OF STEER FEEDING TRIALS—1921–1928

Averages from 10 groups (112 head) fed grain and alfalfa hay—		
Average daily gain	lb.	1·42
Grain required per pound of gain	"	5·09
Hay required per pound of gain	"	15·42
Ratio: grain—hay		1 : 3·3
Averages from five groups (56 head) fed grain, alfalfa hay and corn silage—		
Average daily gain	lb.	1·74
Grain required per pound of gain	"	3·51
Hay required per pound of gain	"	9·45
Corn silage required per pound of gain	"	13·16
Ratio: grain—hay—silage		1 : 2·69 : 3·75
Averages from three groups (36 head) fed grain, alfalfa hay and sunflower silage—		
Average daily gain	lb.	1·53
Grain required per pound of gain	"	5·25
Hay required per pound of gain	"	8·99
Sunflower silage required per pound of gain	"	17·26
Ratio: grain, hay, silage		1 : 1·71 : 3·29
Averages from three groups (33 head) fed grain, alfalfa hay and corn fodder—		
Average daily gain	lb.	1·73
Grain required per pound of gain	"	4·06
Hay required per pound of gain	"	8·56
Corn fodder required per pound of gain	"	5·08
Ratio: grain, hay, corn fodder		1 : 2·11 : 1·25

DAIRY CATTLE

The dairy herd of pure-bred Holstein-Friesian cattle slightly increased in numbers during the year, there being a total of twenty-nine head of registered cattle on December 31, 1929 as compared with twenty-five a year previous.

Agassiz Faforit Re-Echo is retained as herd sire. Two promising young bulls were sold for breeding purposes during the year, one was sold for slaughter, not having developed in a favourable manner, and three are still on hand. One of these with a particularly high fat record on both sides of his pedigree and a strong straight bodied individual is being retained as junior herd sire.

HEALTH OF THE DAIRY HERD

The general health of the dairy herd has been good. The Health of Animals Branch applied the tuberculin test for tuberculosis as well as the blood test for contagious abortion infection, both of which were successfully passed, all cows in the herd giving a negative reaction. Two cows were sold for slaughter, having developed chronic mastitis and being generally undesirable individuals. This was the only trouble of a pathological nature occurring during the year.

REPRODUCTION AND GENITAL DISEASES

As already mentioned the herd reacted negatively to the serum tests for bacillus abortus of Bang, the organism credited with causing a large proportion of abortions.

Every cow in the herd produced a normal living calf during the year with the exception of Lethbridge Aaggie De Kol, a three year old heifer, which had suffered from a disease suspected of being hemorrhagic septicemia as a yearling. It was with difficulty that she became pregnant. Her calf was dead at birth and she has since failed to breed and will have to be disposed of. It would appear that the disease left her in a general debilitated condition from which she has not recovered and also impaired her ability to reproduce.

BREEDING EFFICIENCY

Taking the production of a normal healthy calf every twelve months by every female of breeding age in the herd as one hundred per cent, the breeding efficiency of the herd for 1929 would be 92·8 per cent; thirteen of the fourteen breeding cows and heifers having produced calves during the year. One cow having given birth to twin heifers, the number of healthy calves actually equalled the number of breeding cows.

There was no experimental work conducted during the year. Data were again collected regarding the cost of milk production, and some interesting figures are again available on the cost of raising dairy calves.

Name and number of cow	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
L.E.S. Korndyke Helbon 91372. Age 8.	1,786	1,760·5	1,886	1,671·2	1,604	1,243	1,300·5	1,068	580·5	37·5	.....	520	13,457·2
Lethbridge Flora Korndyke 167477. Age 2	.....	722·5	1,298·5	1·240·5	1·239·5	926	998·5	910·5	768·5	580	569	697	9·950·5
L.E.S. Ianthe DeKol 70079. Age 9	791·5	698	777	779·5	702	455	112	.....	1,169·5	1,190·5	1,165	1,236	9,076·3
L.E.S. Ianthe Korndyke Ormsby 135514. Age 4	207·5	.....	.....	1,041·2	1,791	1,583	1,576·5	1,471·6	1,182·5	900	587	563·5	10,903·8
Lethbridge Lady Hengerveld 167475. Age 2	1,438·5	1,331	1,444·5	1,292·9	1,269	888·5	868·5	588	229	.....	583·5	1,475·5	11,408·9
Lethbridge Canaan Princess 156275. Age 3	943·5	832·5	864	838·5	728·5	581	608	547·5	357	233	120	6	6,659·5
Spruce Farm Queen 124357. Age 6	.....	1,208·5	2,401	2,112·7	1,880	1,636	1,831·5	1,713·5	1,569·5	1,212	999·5	951	17,515·2
Spruce Farm Bertha 125322. Age 6	910	313·5	.....	1,086	2,031·5	2,041·5	1,960·5	1,682·5	1,512·5	1,157	886·5	841	14,422·5
Mooley (Grade No. 1). Age 12	1,399	1,209	1,225	1,032	963	1,035·5	1,086·5	889	350·5	38	236	117	9,580·5
Total	7,476	8,075·5	9,896	11,094·8	12,208·5	10,389·5	10,342·5	8,870·6	7,719·5	5,348	5,146·5	6,407	102,974·4

Average per cow, 11,441·6 lb.

The foregoing table gives the milk produced by each normal cow in the herd which milked for more than four months of the calendar year. This excludes three cows which were not normal, due to pathological reasons, and two grade cows which milked for only a short period during the year.

The average production for each cow was 11,441·6 pounds of milk. This represents a decrease from the herd average of 1928, partly due to the inclusion of two two-year old heifers in the herd, also to the fact that no attempt was made to force any individual for high production.

REVENUE FROM DAIRY HERD—(MILK PRODUCTION ONLY)

Average milk per cow	lb.	11,441·6
Average per cent butterfat		3·47
Average butterfat per cow	lb.	396·76
Value of butterfat at 41·34 cents per lb	$	164 02
Value of skim-milk at 25 cents per cwt	$	27 61
Total revenue from each cow	$	191 63

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

Alfalfa hay, 1·904 tons at $9 per ton	$	17 14
Corn silage, 1·849 tons at $3.50 per ton	$	6 47
Oats and barley meal, 2·317 tons at $30 per ton	$	69 51
Salt, 93 pounds at $30 per ton	$	1 40
160 days on pasture at 5 cents per day	$	8 00
Total feed charge	$	102 52
Financial returns from Dairy Herd:—		
Average return per cow	$	191 63
Average feed per cow		102 52
	$	89 11

FEEDING THE DAIRY HERD

The milking cows were fed at the rate of one and one-half pounds of alfalfa hay and three pounds of corn silage for each one hundred pounds of live weight per day, and one pound of grain (oats and barley) for each three and one-half pounds of milk produced. During periods of rest they were fed liberally in order to fit them for the following lactation period. Practically all feeds used in the dairy herd were farm grown, a small amount of beans fed at the time of freshening being the only exception.

The financial returns are based on local creamery prices for butterfat and on actual cost prices for the feeds used. The figures in the preceding table do not include interest on investment, herd depreciation, building or equipment charges, it being considered that these items are more than set off by the value of calves and appreciation of the junior herd.

CREAM GRADES AND PRICES

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

Table	59·76 per cent
Special	34·15 "
No. 1	6·09 "
No. 2	Nil
No. 3	Nil

The average prices received for butterfat sold from the Station were as follows:—

April to September, inclusive—	
Table	44 cents per pound
Special	36·46 cents per pound
No. 1	35·67 cents per pound
October to March, inclusive	
Table	44 cents per pound
Special	38·67 cents per pound
No. 1	37 cents per pound

The following table gives amount and cost of feed required by individual cows for a stated production of milk and butterfat with figures showing feed cost for the production of one hundred pounds of milk and one pound of butterfat.

COST OF MILK AND FAT PRODUCTION BY INDIVIDUAL COWS

Items	Ianthe		Helbon		Queen		Bertha		Princess		Ormsby		Lady		Flora	
	Amount	Cost	Amount	Cost	Amount	Cost	Amount	Cost	Amount	Cost	Amount	Cost	Amount	Cost	Amount	Cost
	lb.	$	lb.	$	lb.	$	lb.	$	lb.	$	lb.	$	lb.	$	lb.	$
Grain at $1.50 per 100 pounds	4,426	66 39	5,055	75 83	5,648	84 72	5,286	79 29	4,380	65 70	4,795	71 93	4,188	62 82	3,839	57 59
Silage at $3.50 per ton	4,472	7 83	4,101	7 18	3,926	6 87	3,827	6 70	2,939	5 14	3,352	5 87	4,066	7 12	3,538	6 19
Hay at $9 per ton	4,182	18 82	4,105	18 47	4,213	18 96	4,182	18 82	3,998	17 99	3,721	16 74	3,121	14 04	3,567	16 05
	days		days		days		days		days		days		days		days	
Pasture at 5 cents per day	160	8 00	160	8 00	160	8 00	160	8 00	160	8 00	160	8 00	160	8 00	160	8 00
Salt at $30 per ton	lb. 89	1 34	lb. 101	1 51	lb. 113	1 70	lb. 106	1 59	lb. 88	1 32	lb. 96	1 44	lb. 84	1 26	lb. 77	1 16
Total feed cost		102 38		110 99		120 25		114 40		98 15		103 98		93 24		88 99
Milk produced...lb.	9,076·3		13,457·2		17,515·2		14,422·5		6,659·5		10,903·8		11,408·9		9,950·5	
Days milking	313		296		328		316		336		286		317		328	
Feed cost per 100 pounds milk		1 13		0 83		0 69		0 79		1 47		0 95		0 82		0 89
Percentage of butterfat	3·22		3·03		3·42		3·27		3·60		3·30		3·63		3·86	
Feed cost per pound butterfat		0 35		0 27		0 20		0 24		0 41		0 29		0 23		0 23

COST OF RAISING DAIRY CALVES

In the following table the detailed feed cost of raising six dairy calves, four bulls and two heifers to an average age of eleven months and seventeen days is given:—

QUANTITY AND VALUE OF FEEDS CONSUMED BY SIX CALVES FROM BIRTH TO THE AVERAGE AGE OF ELEVEN MONTHS AND SEVENTEEN DAYS

Whole milk, 3,484 pounds at $2 per cwt.	$ 69 68
Skim milk, 8,140 pounds at $0.25 per cwt.	20 35
Experimental Farm calf mixture, 3,299 pounds at $1.77 per cwt.	58 39
Oats, 668 pounds at $1.65 per cwt.	11 02
Oats and barley chop, 771 pounds at $1.50 per cwt.	11 57
Alfalfa hay, 3,501 pounds at $9 per ton.	15 75
Salt, 15 pounds at $30 per ton.	0 23
Pasture, 536 days at 3 cents per day.	16 08
Total feed cost.	$ 203 07
Average feed cost per calf.	33 85

These calves were born between the months of October and February. Figures given cover the period from birth to December 31, 1929.

The feed referred to as calf mixture is a mixture of feeds which was worked out by this Station for use in raising calves where the supply of milk was limited. In such cases it has worked very well in the herds of neighbouring dairymen. It consists of the following feeds: oats, 150 pounds; bran, 50 pounds; oil cake meal, 25 pounds; tankage, 6 pounds; and molasses, 10 pounds.

The calves from which the above data were collected have, without exception, developed well.

SHEEP

LAMB FEEDING TRIALS

Three groups of fifty lambs each were used in feeding trials.

The lambs used were the smaller wether lambs from the Station flock, born during late March and early April, and grazed on the Forest Reserve during the summer. They were weighed individually and allotted as uniformly as possible to the various groups. For the first time at this Station all lambs were branded for the purpose of individual comparison.

Data were secured on the lambs according to feeds used, and also an endeavour was made to secure some information regarding comparative rapidity of gains made by the lambs of Shropshire grade breeding and the lambs of grade Rambouillet and Corriedale breeding. The lambs of different breeding were divided as evenly as possible between the three groups.

The various groups were fed as follows:—

Group 1. Second cutting alfalfa hay, oats and barley.
Group 2. First cutting alfalfa hay, oats and barley.
Group 3. Second cutting alfalfa hay, oats and frozen wheat.

The lambs were weighed into the feed lots on December 22, 1928, at 8·5 cents per pound, the market price of feeder lambs at the time, and weighed an average of approximately 78 pounds each. They were weighed out for shipment to Gainers Limited on February 18 at 12·3 cents per pound, weighing an average of 97·9 pounds each, payment being made on feed lot weight less 3 per cent shrink.

All groups were full fed (about two pounds per head per day) being started on a small amount of oats which was gradually increased and later the heavier grains, barley and wheat, were added.

LAMB FEEDING TRIALS—DECEMBER 23, 1928, TO FEBRUARY 12, 1929

		Group 1, 2nd cutting alfalfa hay oats and barley	Group 2, 1st cutting alfalfa hay oats and barley	Group 3, 2nd cutting alfalfa hay oats and frozen wheat
Number of lambs on trial		50	50	50
Number of days in trial		51	51	51
Total initial weight	lb.	3,900	3,932	3,865
Average initial weight	lb.	78·0	78·6	77·3
Total final weight	lb.	4,907	4,752	4,937
Average final weight	lb.	98·1	95·0	98·7
Total gain per group	lb.	1,007	820	1,072
Average gain per lamb	lb.	20·1	16·4	21·4
Average daily gain	lb.	0·394	0·321	0·419
Quantity of feed consumed				
Oats	lb.	1,375	1,375	1,375
Barley	lb.	3,100	3,100	.....
Wheat	lb.	.....	.....	3,100
Total grain consumed	lb.	4,475	4,475	4,475
Grain per lamb	lb.	89·5	89·5	89·5
Total hay consumed	lb.	4,700	5,550	4,730
Hay per lamb	lb.	94·0	111·0	94·6
Salt per group	lb.	25·0	25·0	25·0
Value of Feeds				
Hay at $9 per ton	$	21 15	24 97	21 28
Oats at $30 per ton	$	20 62	20 62	20 62
Barley at $24 per ton	$	37 20	37 20	.....
Wheat at $20 per ton	$	.....	.....	31 00
Salt	$	0 37	0 37	0 37
Total cost of feed	$	79 34	83 16	73 27
Cost and Value of Lambs				
Value of lambs Feb. 12, feed lot weight less 3 per cent shrink, at $12.30 per cwt	$	585 45	566 96	589 03
Cost of lambs Dec. 23 at $8.50 per cwt	$	331 50	334 22	328 52
Cost of feed	$	79 34	83 16	73 27
Total cost of feed and lambs	$	410 84	417 38	401 79
Average cost of feed per lamb	$	1 58	1 66	1 46
Profit over feed	$	174 61	149 58	187 24
Profit over feed per head	$	3 49	2 99	3 74
Cost to produce 1 pound of gain	$	0 08	0 10	0 07

RESULT OF TRIALS

FIRST VS. SECOND CUTTING ALFALFA (COMPARING GROUPS 1 AND 2)

Where second cutting alfalfa was fed as compared with first cutting, the lambs gained an average of 3·7 pounds more per head with an average hay consumption 17 pounds less than was required by group 2 on first cutting. There was no significant trouble from bloating on second cutting hay.

Both first and second cutting hay were of excellent quality.

OATS AND BARLEY VS. OATS AND WHEAT (COMPARING GROUPS 1 AND 3)

Wheat-fed lambs gained an average of 1·3 pounds more per head than did barley-fed lambs with practically the same hay requirements. The average grade of the wheat fed was about No. 6.

Due to the fortuitous combination of a wide spread in market prices and the abundance of high quality feeds at comparatively low prices, lamb feeding was a highly profitable venture.

COMPARISON OF WHITE AND BLACK FACED LAMBS AS FEEDERS

In all there were 197 lambs used in this comparison, of which there were 82 white faced lambs of Rambouillet and Corriedale breeding and 115 of grade Shropshire breeding. The 115 black faced lambs gained an average of 22·65 pounds during the 51-day period, while the 82 white faced lambs gained an average of 18·11 pounds or an average difference of 4·54 pounds advantage for the Shropshire grade lambs.

Not only did the Shropshire grade lambs make greater gains but they also showed a greater uniformity of gain as shown by a computation of the coefficients of variation (determined from the standard variation) of the two lots which were as follows:—

Black faced lambs—24·24
White faced lambs—27·83

These figures express the degree of variation of the two series from the average gain of their respective groups.

PASTURING SHEEP ON FOREST RESERVE

The breeding flock of sheep kept on the Station were again shipped to the Forest Reserve on June 1 and returned on October 1 as has been done during the past ten years. As the detailed results have been given in the past and this year's results in no way differ from those of previous years it is hardly thought necessary to continue the tabulation. A bulletin summarizing the ten years results is in course of preparation.

SWINE

A breeding herd of twenty-five pure-bred Yorkshire sows was maintained throughout the year, and several very promising gilts of spring and summer farrowing are being reserved for breeding which will distinctly improve the quality of the herd. The same herd sires, Ottawa Beau 17—119713—and Brandon A.F. 343—130247—were used during most of the year, the former being sold in the late autumn and his place being temporarily filled by leasing the boar Elgin Prince 3—122177—from Mrs. J. W. Acheson of Cayley.

The swine herd on December 31, 1928, numbered one hundred and ninety-four, and on December 31, 1929, the total number of hogs on the Station was two hundred and twenty-four. During the year a total of one hundred and thirty-five pigs including seven discarded brood sows were marketed; the net value returned from market hogs being $2,270.72. In addition to the market hogs sold, the Station distributed throughout the district fourteen registered boars and thirty head of registered Yorkshire females.

The swine section of the 1928 report of this Station contains a full report of experimental work done with protein supplements in hog feeding, also a comparison of grain requirements for winter as compared to summer feeding. The investigational work with swine in 1929 was of a different type to the experimental feeding trials previously conducted and comes under the following headings:—

1. Preliminary trials with pastures, and corn and peas for hogging off.
2. A start in the advanced registration of swine.
3. Observations in connection with anemia in suckling pigs and rickets in half grown pigs.

SWINE PASTURES

On May 31, 25 acres of land were set aside for work in swine pastures and hogging-off experiments. The land is bordered on the south by a lake providing an ample supply of water.

The following pasture crops were sown:—

Five acres annual pasture, consisting of a mixture of grains the seed of which was made up of 40 pounds oats, 20 pounds barley, 40 pounds winter wheat, and 10 pounds spring wheat, per acre.

3¼ acres rape.
1 acre kale.
½ acre soy beans.
¼ acre Jerusalem artichokes.
7 acres Mackay peas.
2 acres Gehu Corn.
1 acre Howe's Alberta Flint corn.
5 acres land prepared for alfalfa seeding.

It was not possible to obtain reliable carrying capacity data on the pastures, but some interesting observations were made.

ANNUAL PASTURES

Five acres of annual pasture provided the only feed supplied to 25 full grown brood sows from the middle of July to the end of August. The sows gained in condition during the pasture period. Allowing a charge of 10 cents per day for feeding a mature brood sow, the return from this five acre plot would be $91.80 or $18.36 per acre.

RAPE PASTURE

Thirty pigs weighing 81·1 pounds on the average were on rape pasture as the sole feed for sixteen days commencing August 13, and made an average gain of 3·23 pounds per head, an average daily gain of 0·202 pounds per head. While rape is known as a good hog pasture it is not a suitable feed for young growing pigs without a grain supplement. This is true in general with all pastures. Mature sows put on rape pasture as the sole feed did much better than did the young hogs.

KALE—"THOUSAND HEADED"

The hogs had access to the rape and kale pasture, there being no dividing fence. However, it was particularly noticeable that the hogs would not eat the kale so long as rape was available. As a matter of fact, none of this plant was consumed by hogs, but was later used for sheep pasturing.

SOY BEAN

The soy beans made a fairly good growth, but were frozen long before coming to sufficient maturity for good pasturing and are obviously not to be recommended as a hog pasture in this district at the present stage of their development in northerly climates.

ARTICHOKES

The one-fourth acre of Jerusalem artichokes made an excellent growth, and while seeded somewhat late, developed reasonably large tubers which were eagerly sought for by the hogs. This plant would seem to have possibilities on irrigated land.

PEAS AND CORN

The seven acres of peas and the three acres of corn were pastured together, the hogs having access to both the corn and peas at the same time. Twenty-five pigs averaging 69·8 pounds were turned on this pasture on August 29. They were taken off on October 5, averaging 112·6 pounds. The total gain made by this group was 1,069 pounds, or 42·76 pounds per head, an average gain of 1·156 pounds per head per day. It was observed that the plot of Howe's Alberta Flint corn was eaten first, this being the earliest variety. It was followed by the Gehu and the peas which were eaten together. A group of fourteen pregnant sows were also run on this pasture for forty-two days.

It was not possible to arrange the work with pastures in such a way as to arrive at carrying capacity and total financial returns this year. The observations would lead to the conclusion that mixed grain pastures, peas and corn, have possibilities as annual pastures for the carrying of brood sows and the growing out of market hogs. It is possible also that further experimentation will reveal that artichokes have a place in the swine feeding scheme of the irrigated farm.

ADVANCED REGISTRATION OF SWINE

A group of ten sows were entered in the Advanced registry policy which is being conducted by the Dominion Live Stock Branch. The Advanced Registry policy is being inaugurated with a view of selecting the individuals which are producing litters which exhibit in the most desirable combination the inherent characteristics of efficiency in the conversion of food into body weight and the production of a desirable carcass from the standpoint of market requirements. The results of these tests have not been completed by the end of the year, but will appear in the next report of this Station.

OBSERVATIONS IN CONNECTION WITH ANEMIA IN SUCKLING PIGS AND RICKETS IN HALF GROWN PIGS AND THE RELATION OF THESE DISEASES IN SWINE TO HOUSING

The following based on observations made during the year on swine housed under conditions allowing access to sunshine or depriving them of sunshine, deals with a matter of vital interest to Canadian swine raisers.

The cycle of hog prices is well known, the peak prices being reached in the period of April to September. In order to have swine reach this market under what is considered a good system of management it is necessary that they spend a part at least of the earlier period of their existence during the winter months. The swine section of the report of this Station for 1928 would indicate where hogs were housed in colony houses or stray sheds with yards open to the south, winter swine production at this Station was conducted on almost a parity with summer production from the standpoint of economy and rapidity of gain.

During the summer of 1928 a permanent piggery was built. It is a well constructed building with good drainage, well lighted and well ventilated but not provided with outside runs nor with access to direct sunlight as was the case with the colony houses or the straw shed.

In the late autumn of 1928 a group of eleven sows farrowed in the piggery. The building being warm and dry had the appearance of being ideal for wintering young pigs. Up to the age of approximately three weeks the young pigs appeared to do very well, but from this time on, they began to turn curly in the coat and to take on a generally unthrifty appearance. At the age of four to five weeks, a few deaths occurred which on examination revealed symptoms of anemia. At this time, all pigs with the exception of one litter, were moved from

the piggery to the straw shed where a few deaths of the weaker pigs occurred, but a general improvement appeared to take place. One litter of seven pigs was retained in the piggery to serve as a check. By weaning time five of the seven had died.

One sow farrowed in a colony house with south exposure on November 20, with eight pigs. These pigs were raised under these conditions and did not suffer the disease which appeared to affect in some measure all of the eighty-three pigs which had been kept in the piggery for a period of from fifteen to twenty-nine days.

The following tabulation indicates the relative health of winter pigs with access to direct sunlight in varying amounts. Litters from three fairly uniform sows are compared. The first two sows farrowed in the piggery. One was later removed to a straw shed where the pigs had outside runs. The third sow farrowed in a small colony house from which the pigs could run out at will.

Sow No.	—	Number of pigs in 3 days	Number of days kept in piggery	Deaths in piggery	Deaths in straw shed	Number of pigs in 60 days	Average weight of pigs in 60 days
							lb.
16	Born in piggery	8	28	.....	2	6	22·5
48	Born in piggery	7	62	5	.....	2	14·0
929	Born in colony house	8	.....	.....	.....	8	30·5

One pig in litter 48 died the day following weaning, leaving only one pig alive from this litter, which had been kept from the direct rays of the sun since birth.

In order to confirm our opinion regarding the cause of the above-mentioned conditions arrangements were made with the laboratory staff of the Galt Hospital, Lethbridge, who kindly took hemoglobin percentage readings and red cell counts of four pigs, revealing the following conditions:—

No. of pig	137	136	138	135
No. of dam	16	35	48	292
Place of birth	Piggery	Piggery	Piggery	Colony house
Days in piggery	28	27	73	—
Days in straw shed	46	46	—	—
Per cent hemoglobin, Jan. 26	60	50	35	70
Red cells per cu. mm	7,000,000	5,260,000	4,750,000	7,000,000

*Normal hemoglobin	80 per cent of human standard
Red cells	7 to 8 millions

* McGowan, Rowett Research Institute.

The results of the blood test appeared to reveal a correlation between access to sunlight, hemoglobin percentage and the number of red corpuscles per cu. mm. of blood.

OX LIVER AS A CURE FOR ANEMIA

On February 4, the following pigs were collected in the piggery: 136, 138, 139, 140. These pigs were all showing decided symptoms of anemia. Ground ox liver at the rate of 5 per cent of their grain ration was fed. Weights were not taken at this period, but a decided improvement was quite apparent during the period liver was fed. In fact, all four pigs developed a particularly thrifty appearance.

On March 12, the liver was discontinued in the ration of these four pigs and they were confined in pens which were well lighted but not given access to direct sunlight. On March 25 the rickets became evident in pig No. 139; on

March 30, in pig No. 138, and in pigs No. 136 and No. 140 on April 5. A basal ration of oats and wheat, equal parts, with 5 per cent digester tankage and skim-milk was fed *ad lib.*

They were allowed to go untreated until April 26, at which time they were unable to walk, and the following treatments were started on the different individuals:—

Pig 138 was exposed to direct sunshine on April 26, and by May 1 was showing some improvements. The skin became whiter and the pig made some attempt to walk. Improvement continued throughout the summer and the pig became apparently normal except for slight deformity of the bone. This pig was bred on August 19, and was then confined to a pen away from direct sunlight. She farrowed on December 9, with nine pigs all apparently normal at birth, weighing an average of 2·1 pounds. All pigs died within six weeks, exhibiting the symptoms of anemia.

Pig 139 was used as a check, no treatment being given. This pig became gradually worse, being unable to lift his head to eat. He was given access to direct sunlight in August and regained complete use of his legs, but showed some bone deformity.

Pig 140 was fed crude cod liver oil at 5 per cent of the grain ration and made a complete recovery from rickets, going to market on December 19, grading as a "heavy."

Pig No. 136 was fed iodized salt at 2 per cent of the grain ration, with obviously detrimental results. On June 22 it was decided to give this pig the sunshine treatment as iodized salt obviously had no part to play in the cure of rickets. After an over-exposure to sunshine of 4½ hours the pig died.

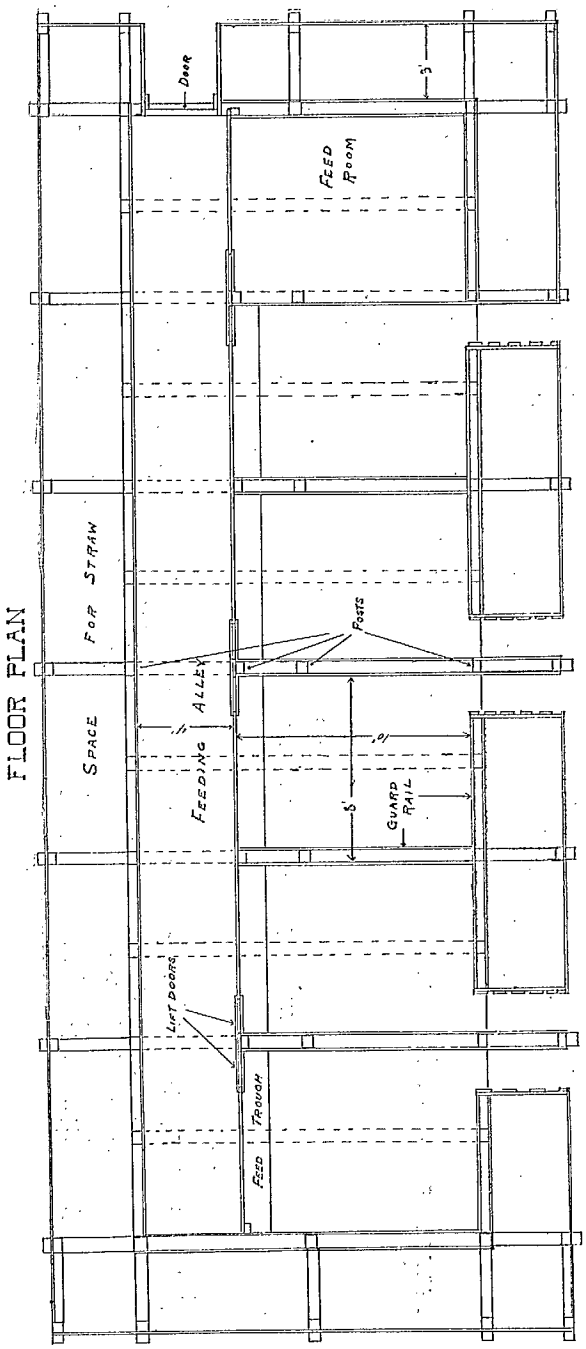
ANEMIA AND RICKETS IN SUMMER

It was found by trial during the summer of 1928 that pigs housed without access to direct sunlight will develop anemia, while young, and that if confinement is continued those individuals which survive anemia will do well for a period and later fall a prey to rickets.

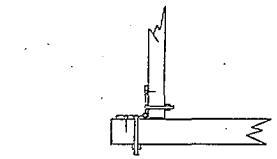
SWINE SHELTERS

The swine herd at this Station has been for the most part housed in straw shelters and portable hog cabins. These have worked out very well speaking generally, but with some difficulties arising in some cases due to faulty construction. It would appear from the experience of this Station that the use of properly constructed portable hog cabins and straw sheds could aid materially in the economic production of swine, because their use effects a considerable reduction in overhead charges as compared to the use of the standard type of hog house, and more particularly because they are more conducive to the health of the animals.

STRAW SHELTERS.—The first straw shelter for swine was constructed at this Station in 1925. It was approximately one hundred feet long and sixteen feet wide inside measurements. The ceiling was six feet high, and five windows were set in the south wall. The walls were of straw, two and a half feet thick on the south and east sides and three and one-half feet thick on the west and north sides. The straw was supported on the roof by discarded woven wire being tightly drawn over horizontal rafters. The outside support for the straw wall was of woven wire, attached to tall posts. Inside the straw was supported by lumber three feet up from the ground and the rest was wire. The shelter was divided into ten pens and a feed room, each pen having an opening into a small yard at the south. The floor was of earth.

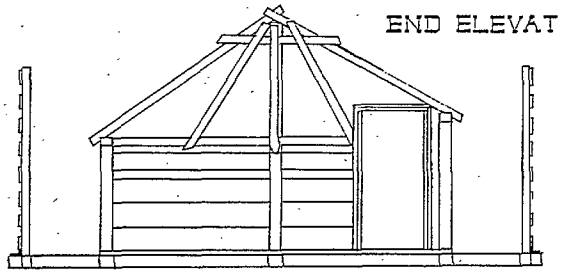

DOOR
5'
FEED ROOM
FOR STRAW
POSTS
SPACE
ALLEY
FEEDING
10'
5'
GUARD RAIL
LIFT DOORS
TROUGH
FEED

FLOOR PLAN



DETAIL OF HINGED STUDDING

END ELEVATION



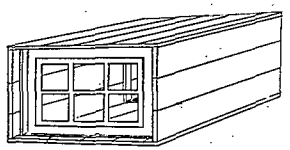
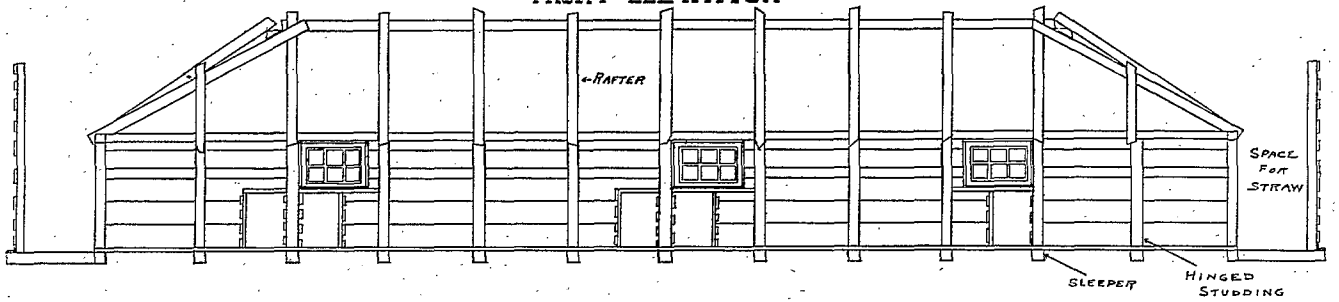


DIAGRAM OF WINDOWBOX

FRONT ELEVATION



PERMANENT FRAMEWORK FOR STRAW SWINE SHELTER

This shelter proved very satisfactory for the raising of all classes of pigs in dry weather and particularly satisfactory for raising winter litters. It was always well ventilated and free from draughts. The openings to yards at the south provided the pigs with access to direct sunlight. It had, however, some noticeable disadvantages; the wire supporting the straw roof which was flat, sagged between the rafters making pockets which allowed the water to leak through unduly during rainy periods. The use of woven wire to retain the straw in the walls was not entirely satisfactory for the bulging between posts induced uneven setting of the straw resulting in holes and water soaked pockets. The floor being earthen was not satisfactory for farrowing as the sows sometimes rooted out large holes and made unsatisfactory farrowing conditions.

In 1928 another shelter or straw building was built. This one was built on 4 by 4 inch sleepers, 48 by 24 feet inside measurement, with a three foot straw wall and a hip-roof with a one-third pitch. By using poles and lumber for the sides and roof instead of woven wire the uneven settling of the straw into holes and pockets was avoided. The building was floored with a cheap grade of two-inch plank No. 2 common. It extends north and south with pens opening into yards to the east and west, a four foot alley-way runs through the centre the full length of the building. The building has shed the rain, has been well ventilated, the pens well suited for farrowing, and in fact it has overcome all of the disadvantages of the first straw structure built, except that with the outside opening of the pens to the east and west a draught is caused at times of high westerly winds and also the periods of direct sunlight available to the pigs in their outside runs are shortened to the morning and afternoon by the shadow of the building. As indicated this building is built entirely of wood and straw. The outside supports for the straw wall are hinged to the sleepers at the bottom, and will swing out and down making it an easy matter to change the straw filling of the walls when this becomes necessary.

An illustration of a desirable type of straw shelter is shown in this report.

Permanent Piggery.—In 1928 a well-built piggery of the standard type was constructed with well-drained concrete floors, and with wooden sleeping berths but no outside runs. Pigs have not done well if kept in this building over periods of time. Young pigs born in the standard piggery and confined in it for from two to four weeks develop anemia and older pigs develop anemia presumably due to lack of access to direct sunlight.

Portable Cabin.—The portable hog cabin has proven a very satisfactory type of hog shelter at this Station. In summer they can be hauled out to the pastures where they provide shelter from cold, rain and sun. They also provide excellent housing for all ages of pigs when banked with straw during the winter time. Good results have been had with winter pigs both in the straw houses and the hog cabins with no losses from anemia and rickets, while hogs kept in standard permanent piggery without access to direct sunlight have developed either of these diseases in one hundred per cent of the cases observed.

CEREALS*

The season had advanced sufficiently by April 15 to permit of cultural work being done on the land, and seeding was commenced in many localities about April 20. Seeding operations were interrupted several times by heavy rains so that the seeding of wheat in the district continued well into the latter half of May, and the seeding of oats and barley extended into June. Additional rain in June provided favourable moisture conditions for growth until the

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

middle of July, but from that time on the lack of rain and the occurrence of hot winds checked the development of crops, and hastened their maturity.

Practically no damage was reported from hail anywhere in the district.

Conditions for harvesting were ideal throughout the month of August, there being only one rain during the whole month that delayed cutting. A few rains delayed harvesting operations in September, but most of the grain was in the stook when they occurred. Four degrees of frost were recorded on September 6, but all grain throughout the district was matured sufficiently by that time that no damage was done. The few rains that occurred during September and October delayed threshing or combining for only short intervals in all cases. The number of combines used in the district had greatly increased over that of the past season and conditions were favourable for operating them. All grain was threshed well in advance of the commencement of adverse winter weather.

DRY LAND

VARIETY TESTS

The varieties of wheat, oats and barley that are commonly grown in the district, as well as a few promising ones of recent origin, were tested in duplicate one-fortieth-acre plots. An ordinary press drill was used and seeding was done on summer-fallowed land. Just previous to harvesting, the two outside rows and one foot from either end of the plots were removed. This provided ordinary field conditions for the remainder of the plots that were harvested for yield determinations.

WHEAT

Twelve varieties of wheat were seeded for comparative purposes on April 25, at the rate of seventy-five pounds per acre. The ground was sufficiently moist at the time of seeding for all varieties to germinate evenly.

WHEAT—TEST OF VARIETIES (DRY LAND)

(Grown in Duplicate plots of 1/40th Acre Each)

Variety	Date of ripening	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre	Average yield per acre for past three years	Yield for past three years in per cent of Marquis 10 B
			in.		bush.	bush.	
*Hard Federation No. 31	Aug. 10	107	31	10	32·2	.....	.....
Red Bobs No. 222	Aug. 9	106	31	10	32·0	36·1	118·4
Supreme	Aug. 11	108	32	10	30·1	35·0	114·8
Early Triumph	Aug. 10	107	31	10	29·8	34·4	112·8
*Early Red Fife Ottawa 16	Aug. 12	109	34	10	27·7	.....	.....
Renfrew	Aug. 12	109	31	10	24·8	33·0	108·1
Marquis Ottawa 15	Aug. 9	106	31·5	10	27·8	32·3	106·0
Marquis 10 B	Aug. 9	106	31·5	10	27·2	30·5	100·0
Red Fife Ottawa 17	Aug. 14	111	32	10	22·5	29·4	96·4
Garnet Ottawa 652	Aug. 3	100	33	10	28·3	28·3	92·8
Reward Ottawa 928	Aug. 4	101	28	10	27·0	27·4	90·0
Kitchener	Aug. 11	108	30	10	23·3	27·1	88·9

*Tested for past two seasons only.

Hard Federation No. 31, while it has produced a high yield in each of the past two seasons, is a variety that should not be grown in the district. It is a white, soft wheat, and is therefore marketed at a considerable discount. If allowed to become mixed with varieties of hard spring wheat it would depreciate their value. It may prove of value in crossing with some of the hard red Cana-

dian wheats. The next three varieties in the table are selections from the original Red Bobs variety. They have all proved good yielders and in most seasons the Red Bobs No. 222 and Early Triumph have been a few days earlier than Marquis in ripening. Their milling and baking qualities, as well as the appearance of the grain, are slightly inferior to those of Marquis. Early Red Fife has been tested for only the past two seasons, and while its yield has been somewhat higher than that of Marquis, it has been found to shatter so readily that it cannot be recommended in preference to Marquis. Renfrew is one of the latest varieties in ripening. It has straw a few inches longer than that of Marquis and its milling qualities compare favourably with those of Marquis. In districts where earliness is not an important factor, and straw of good length is required, Renfrew should be found suitable. Garnet and Reward are the two earliest of the varieties under test, being generally nearly a week earlier than Marquis. There is little difference in yield between these two varieties. Reward is more to be recommended than Garnet on account of its better milling qualities and less tendency to shatter.

OATS

There were twelve varieties of oats under test, but only seven of these have been tested for the past three years. They were seeded on May 25, and the rate of seeding was seventy-five pounds per acre.

OATS—TEST OF VARIETIES (DRY LAND)
(Grown in Duplicate Plots of 1/40th Acre Each)

Variety	Date of ripening	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre	Average yield per acre for past three years	Yield for past three years in per cent of Banner
			in.		bush.	bush.	
*Markton	Aug. 5	102	32·5	9·5	49·4	.....	.....
*Scottish	Aug. 13	110	25·5	10·0	43·4	.....	.....
*Gerlach	Aug. 9	106	27·5	7·5	43·5	.....	.....
Banner Ottawa 49	Aug. 7	104	32·5	9·0	41·9	67·5	100·0
Longfellow Ottawa 478	Aug. 5	102	34·0	8·0	54·9	67·4	99·8
Leader	Aug. 11	108	26·5	6·0	37·7	67·3	99·7
Gold Rain	Aug. 5	102	33·0	9·5	50·4	66·6	98·7
*O.A.C. 3	Aug. 3	100	25·5	9·0	54·8	.....	.....
Victory	Aug. 11	108	28·5	9·0	34·1	62·9	93·2
Danish Island	Aug. 4	101	25·5	9·5	36·8	62·9	93·2
*Laurel Ottawa 474	Aug. 7	104	30·0	10·0	37·4	.....	.....
†O.A.C. 144	Aug. 14	111	28·0	9·0	39·5	.....	.....

*Tested for past two seasons only. †Tested for one year only.

Markton is a variety which has been giving good results in Montana. It was imported from there two years ago and has been a high yielder the two years it has been under test. Scottish is the name given to an unnamed sample imported from Scotland two years ago. The results obtained from it for the past two seasons have been also promising. Gerlach is not grown to any extent in Alberta. It has compared favourably with other varieties tested during the last two seasons. Banner has generally been the highest yielding variety on irrigated land, and the fact that in the past few seasons the rainfall has been heavier than usual probably accounts for its standing higher in the list. Victory was the heaviest yielding variety on dry land during most of the dry seasons. Laurel is a hulless variety and the best one of this class tested so far.

BARLEY

Twelve varieties of barley were tested. These were seeded at the rate of seventy-two pounds per acre on April 25.

BARLEY—TEST OF VARIETIES (DRY LAND)

(Grown in Duplicate Plots of 1/40th Acre Each)

Variety	Date of ripening	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Yield per acre	Average yield per acre for past three years	Yield for past three years in per cent of O.A.C. 21
			in.		bush.	bush.	
Trebi	Aug. 3	100	24·0	10	46·7	66·2	152·2
Bark's	Aug. 9	106	25·5	10	28·1	56·2	129·2
*Hannchen	Aug. 5	102	28·5	10	45·8	.....	.....
Gold	Aug. 5	102	21·0	10	28·3	54·8	126·0
Cape	July 30	96	29·0	10	53·6	54·7	125·8
Swedish Chevalier	Aug. 8	105	25·5	10	31·5	54·6	125·6
*Horn	Aug. 6	103	28·0	10	39·6	.....	.....
Junior Ottawa 471	July 27	93	28·0	9	36·3	50·3	15·7
Bearer Ottawa 475	Aug. 8	105	29·5	10	28·8	49·2	113·1
Himalayan Ottawa 59	July 29	95	28·0	8	33·3	45·4	104·4
O.A.C. 21	Aug. 1	98	30·0	9	27·2	43·5	100·0
*Canadian Thorpe	Aug. 8	105	26·0	10	28·7	.....	.....

*Tested for past two seasons only.

Trebi has been an outstanding variety in yield during the period it has been under test. Its yield for the past three seasons has been ten bushels per acre higher than that of Bark's, the second in order of yield. It is inclined to be coarse and is less desirable for malting purposes than several of the other varieties. Bark's is a high yielding variety under irrigated conditions, and on account of the past three seasons being more favourable than usual in regard to moisture it has given much better results on dry land. Hannchen is a two-rowed variety and while it has been under test for only the past two seasons, the results obtained from it have been favourable. Horn is another promising two-rowed variety which has been tested for only two seasons. It has a thin hull, and is considered in Montana, from where it was imported, to be of good feeding value. Junior and Himalayan are two varieties of the hulless type. O.A.C. 21 has been a rather low yielding variety on dry land but is the one preferred by the maltsters for brewing purposes.

ROD-ROW METHOD OF TESTING CEREAL VARIETIES

Preliminary tests are conducted in rod-row plots of new varieties as well as many of the older or more important ones. These plots consist of five rows, seven inches apart, and 18·5 feet in length, and each variety is grown in four such plots located in different parts of the field. Just previous to harvesting one foot is removed from the ends of the plots and the two outside rows are discarded. This removes all plants that have grown under abnormal conditions, and the results for the different varieties are then determined by harvesting the three remaining rows of the four plots, and averaging their yields.

The yields and other information obtained from the testing of different varieties of wheat, oats and barley by this method may be seen in the three tables following. Varieties which have been tested for only three years appear below, also in order of yield.

AVERAGE RESULTS FOR PAST FIVE-YEAR OR THREE-YEAR PERIOD OF VARIETIES OF WHEAT TESTED IN ROD ROW PLOTS (DRY LAND)

Variety	Number of years under test	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre
			in.		lb.	bush.
Early Red Fife Ottawa 16	5	108·2	36	9·7	62·8	28·6
Early Triumph	5	104·1	32	9·9	61·9	28·4
Supreme	5	105·2	32	10·0	63·6	27·8
Marquis Sask. 7	5	106·4	33	10·0	63·3	27·0
Marquis Ottawa 15	5	106·8	32	9·6	61·4	26·0
Ceres	5	103·3	33	9·2	64·6	26·0
Kitchener	5	108·4	36	10·0	62·0	26·0
Red Bobs 222	5	105·1	34	9·9	63·4	25·5
Huron Ottawa 3	5	107·6	34	9·5	62·1	25·3
Acme	5	108·5	36	8·0	63·9	25·0
Ruby Ottawa 623	5	99·1	32	9·3	63·5	24·6
Marquis 10B	5	107·0	33	9·7	62·8	24·4
Golden	5	107·3	33	9·6	62·1	24·1
Renfrew	5	107·9	37	9·7	60·4	23·4
Reward Ottawa 928	5	102·5	32	9·5	65·4	22·3
Garnet Ottawa 652	5	99·0	31	9·3	62·3	22·2
Kubanka Ottawa 37	5	109·8	38	8·0	64·5	21·3
Prelude Ottawa 135	5	96·8	29	9·1	63·8	19·9
White Federation 4981	3	114·3	25	9·9	61·7	28·6
Vermillion	3	118·7	39	9·4	60·7	28·5
Reliance	3	115·5	33	9·3	62·5	26·3
Federation 4734	3	117·6	30	9·9	60·7	26·2
Red Fife Ottawa 17	3	119·3	38	10·0	61·0	26·2
Hard Federation 71	3	113·4	28	10·0	62·2	26·1
Quality	3	113·0	32	9·9	63·8	25·3
N. Fishers 2B	3	115·0	35	9·8	62·5	25·1
Parkers Selection	3	111·6	37	9·8	64·0	24·3
Chelsea Ottawa 11	3	111·9	36	9·4	61·7	24·0
Hard Federation 31	3	113·3	29	9·9	61·3	23·9
Hard Federation 4733	3	114·4	27	9·9	60·7	23·7
929B	3	112·2	34	9·4	65·5	23·6
N. Fisher's 1B	3	116·3	36	10·0	62·5	23·4
928 QQ 2	3	111·2	31	9·9	62·3	23·3
Red Quality A	3	114·4	32	9·2	63·3	22·1
923L6	3	112·8	31	9·1	61·2	21·9
928 WID	3	105·5	33	9·2	61·7	21·9
939D	3	105·7	32	8·8	63·8	21·9
932A	3	106·9	31	9·3	63·5	21·0
928P	3	102·5	28	9·5	63·0	19·9

AVERAGE RESULTS FOR PAST FIVE-YEAR OR THREE-YEAR PERIOD OF VARIETIES OF OATS TESTED IN ROD ROW PLOTS (DRY LAND)

Variety	Number of years under test	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre
			in.		lb.	bush.
Leader	5	104·1	34	9·1	33·9	53·2
Columbian Ottawa 78	5	104·0	35	9·5	39·5	51·7
Kherson	5	96·4	33	9·3	39·3	50·1
Gold Rain	5	101·7	35	9·2	37·5	49·4
Danish Island	5	104·1	36	9·2	34·5	49·4
Irish Victor P	5	103·1	36	9·2	37·1	49·3
Banner Ottawa 49	5	102·9	34	9·0	39·1	48·3
Victory	5	105·4	35	9·3	39·1	47·9
Gerlach	5	102·8	36	8·9	37·5	47·2
Leader B	5	103·6	34	8·8	38·3	45·5
Legacy Ottawa 678	5	102·6	32	9·3	36·3	44·2
Alaska	5	96·5	32	9·5	38·8	38·9
Leader A	5	98·7	36	8·9	37·1	36·4
Laurel Ottawa 474	5	101·7	31	9·4	51·9	22·2
O.A.C. 144	3	112·7	38	9·5	36·0	53·2
Longfellow Ottawa 478	3	112·7	38	9·3	37·8	49·9
Markton	3	112·9	35	9·0	38·7	48·0
Richland	3	104·5	30	9·8	38·0	47·1
O.A.C. 3	3	105·5	33	9·9	35·0	43·9
White Cross	3	102·1	32	9·2	34·7	43·8
Abundance	3	111·8	36	9·5	37·5	43·0
Cole	3	103·4	33	9·2	34·7	38·7

AVERAGE RESULTS FOR PAST FIVE-YEARS OR THREE-YEAR PERIOD OF VARIETIES OF BARLEY TESTED IN ROD ROW PLOTS (DRY LAND)

Variety	Number of years under test	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre
			in.		lb.	bush.
Hanchen	5	97·6	29	8·4	52·8	41·7
Himalayan Ottawa 59	5	98·2	24	7·8	62·8	35·8
Swedish Chevalier	5	99·6	28	8·3	52·8	35·6
Charlottetown No. 80	5	98·6	28	8·4	52·3	35·3
Chinese Ottawa 60	5	99·9	34	8·5	48·1	34·5
O.A.C. 21	5	99·6	34	8·3	46·5	33·3
Junior Ottawa 471	5	92·1	24	8·9	61·6	31·7
O.A.C. 21 (Sask. Sel.)	5	99·8	32	8·4	47·3	31·6
Bearer Ottawa 478	5	97·8	32	8·4	45·1	31·2
Duckbill Ottawa 57	5	97·5	29	9·2	51·4	25·0
Trebi	3	101·3	25	9·1	48·7	45·3
Horn	3	106·2	31	8·4	53·5	42·6
Cape	3	102·0	26	9·3	44·8	40·8
Mariout	3	102·3	25	8·9	48·3	35·1
Bark's	3	110·5	28	9·1	45·7	34·5
Star	3	97·8	25	9·0	48·0	33·1
Velvet	3	102·1	32	8·8	45·7	32·4
Canadian Thorpe	3	106·2	31	9·1	50·7	27·7
Early Chevalier Ottawa 51	3	100·0	32	8·5	51·5	26·4

FIELD BEANS

Thirteen varieties of field beans were grown for comparative purposes. These were all seeded by hand on May 11 at approximately one and one-half bushels per acre, in rows one rod in length and twenty-two inches apart. Each variety was grown in nine such rows in different parts of the field and the yields of these were averaged to determine the standing of the variety. Harvesting was done about the middle of September, when all varieties were fully matured.

In the following table results are shown for the four years in which variety tests have been conducted, and the varieties are arranged in order of yield.

BEANS—TEST OF VARIETIES (DRY LAND)

Variety	Number of days maturing	Colour and size of beans	Yield per acre				Average for 4 years
			1925	1926	1928	1929	
			bush.	bush.	bush.	bush.	bush.
Luther Burbank	113	White, small	13·54	23·10	3·19	18·12	14·49
Australian Brown	110	Brown, large	13·96	12·30	5·25	18·32	12·46
Robust	114	White, small	10·99	16·10	3·50	19·09	12·42
Great Northern	119	White, medium	9·43	10·70	4·79	22·92	11·96
Meyer	114	White, small	10·00	12·10	4·16	17·88	11·04
Imperial Pea Bean	114	White, small	11·98	13·10	3·72	15·21	11·00
Navy Ottawa 711	114	White, large	7·55	11·30	4·92	17·69	10·38
Large White Ottawa 713	114	White, large	9·06	6·90	3·82	18·97	9·69
Yellow Six Weeks	107	Yellow, large	8·34	12·60	3·39	13·28	9·40
Beauty Ottawa 712	103	White and brown, medium	9·70	8·80	3·30	15·31	9·28
Lady Washington	119	White, medium	3·86	12·40	3·38	17·16	9·20
*Michigan Early Wonder	118	White, small	.....	19·60	3·30	17·51	13·47
*Kotenashi	120	White, small	.....	10·00	3·38	13·81	9·06

*Average for 3 years.

Luther Burbank appears so far to be the variety most worthy of recommendation, not only on account of its being suitable in size and colour for the market requirements, but it is also a few days earlier in maturing than most other varieties of the small white type. Robust and Michigan Early Wonder are also good varieties of this type. The beans imported from Japan to Alberta

to supply the trade are of the Kotenashi variety. It has been found late in maturing at the Station but is desirable from other standpoints. Great Northern has also been found late in maturing.

IRRIGATED LAND

VARIETY TESTS

On irrigated land variety tests with wheat, oats and barley are conducted by only the rod-row method, as described in the section of this report dealing with the testing of cereal varieties on dry land. The land on which such tests are conducted is in a three-year rotation of corn, peas and grain. The wheat and barley varieties were seeded this season with a small hand seeder and the oats varieties were seeded by hand. In previous seasons all seeding was done by hand. The rates of seeding were as follows: wheat 1½ bushels per acre, oats 2½ bushels per acre, and barley 2 bushels per acre. The wheat varieties were seeded on April 23, the oats varieties on April 27, and the barley varieties on May 18.

One irrigation was applied to all varieties on July 12.

The season was free from frost until after the latest varieties had matured, and as there were few storms during the harvesting season the quality of the grain produced was of a high standard in nearly all cases.

AVERAGE RESULTS FOR PAST FIVE-YEAR OR THREE-YEAR PERIOD OF VARIETIES OF WHEAT TESTED IN ROD ROW PLOTS (IRRIGATED LAND)

Variety	Number of years under test	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre
			in.		lb.	bush.
Supreme	5	119·3	43	8·8	64·1	67·7
Early Triumph	5	116·9	45	9·2	64·4	65·9
Kubanka, Ottawa 37	5	128·0	55	5·8	63·5	64·3
Huron, Ottawa 3	5	123·5	50	8·1	64·8	63·1
Marquis, Ottawa 15	5	121·5	46	8·2	64·5	61·6
Marquis, Sask. 7	5	121·0	48	8·1	63·6	61·1
Renfrew	5	123·4	52	7·8	62·9	59·8
Kitchener	5	125·5	51	8·2	64·4	59·7
Red Bobs 222	5	117·6	45	9·2	63·9	59·5
Marquis 10 B	5	121·7	47	7·8	63·3	58·7
Ceres	5	120·4	46	7·3	63·3	58·6
Red Quality A	5	116·7	43	8·0	64·8	58·1
929 B	5	115·5	44	7·6	65·6	56·7
Golden	5	122·6	47	7·1	62·9	56·4
Early Red Fife	5	124·6	50	8·5	64·5	55·4
Reward, Ottawa 928	5	113·4	44	9·3	65·0	55·0
928L6	5	117·7	44	7·9	64·6	54·2
Chelsea, Ottawa 11	5	118·3	48	6·6	64·2	53·2
928QQ2	5	115·5	40	9·1	63·8	51·7
Acme	5	126·9	52	4·6	62·9	51·7
Quality	5	115·0	44	9·3	64·8	51·0
Garnet, Ottawa 652	5	110·4	41	8·8	64·3	50·1
Parker's Selection	5	117·3	49	7·6	63·9	49·8
928 D	5	112·3	42	9·6	64·1	48·3
932 A	5	112·8	42	8·2	65·3	48·2
939 D	5	112·9	44	7·4	65·0	47·8
928 WID	5	113·6	43	8·3	64·4	46·7
Ruby, Ottawa 623	5	110·4	42	9·1	65·1	44·9
Prelude, Ottawa 135	5	108·3	40	9·0	64·8	31·4
White Federation 4981	3	120·5	41	9·8	63·2	71·1
Hard Federation 71	3	121·6	41	9·8	65·2	61·0
Vermilion	3	129·8	54	5·8	62·3	60·0
Hard Federation 31	3	119·8	40	9·5	63·2	57·0
Hard Federation 4733	3	121·5	39	9·6	62·0	55·5
N. Fisher's 2B	3	123·0	47	8·8	64·0	55·2
Reliance	3	126·3	48	6·2	64·7	53·9
N. Fisher's 1B	3	125·5	50	6·5	62·2	53·8
Seagalstad	3	125·5	48	5·8	62·2	49·1
Red Fife, Ottawa 17	3	129·3	51	7·5	62·3	44·9
Federation 4734	3	127·7	43	8·2	59·8	41·7

Of the varieties tested for a five-year period Supreme and Early Triumph, two selections from Red Bobs, have been found the highest yielders. As mentioned in connection with the results obtained from variety tests on dry land, these two varieties are generally inferior to Marquis in colour, especially when adverse weather conditions prevail at harvesting. Kubanka is a durum wheat and, while it stands high in yield, it cannot be recommended for the district on account of its commanding a considerably lower price than Marquis when marketed, and having a decidedly weak straw. Huron is a good yielding variety of the bearded type. Its milling qualities, however, are inferior to those of Marquis. Marquis is still recommended as the standard variety for irrigated land. Renfrew resembles Marquis closely in appearance, the chief difference being that it is a little later in maturing and generally from four to six inches longer in the straw. The appearance of the grain and the milling qualities compare with those of Marquis. Kitchener is also a few days later than Marquis and a few inches longer in the straw. Red Bobs 222 is a selection from the original Red Bobs and is very similar in many respects to Early Triumph. Ceres is a comparatively new variety of the bearded type. It has been giving good results in many of the rust infested areas of Saskatchewan and Manitoba, but so far there seems to be no reason for growing it in preference to Marquis in Alberta. Reward has proved to be about eight days earlier in ripening than Marquis on irrigated land, but about six bushels lower in yield per acre. Garnet is about three days earlier than Reward, but lower in yield by about five bushels per acre. Where late seeding is practised and an early variety is required, Reward or Garnet, preferably the former, should give good service.

A number of strains of Hard Federation have been tested over a three-year period. A few of these have proved to be good yielders, but as they are white wheats they are not recommended for growing in this country. Their outstanding qualification is their strong straw and tight chaff, which enables them to stand in the field long after ripening without shattering. They are valuable wheats for crossing with our hard red Canadian varieties. Vermilion is a high yielding variety, late in maturing and of poor milling quality.

AVERAGE RESULTS FOR PAST FIVE-YEAR OR THREE-YEAR PERIOD OF VARIETIES OF OATS TESTED IN ROD-ROW PLOTS (IRRIGATED LAND)

Variety	Number of years under test	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre
			in.		lb.	bush.
Banner, Ottawa 49	5	113·2	53	7·4	35·3	110·8
Leader	5	114·7	53	6·5	34·4	108·9
Columbian, Ottawa 78	5	114·7	53	7·3	37·3	107·8
Legacy, Ottawa 678	5	109·9	47	7·7	36·0	103·3
Kherson	5	107·3	46	7·6	35·1	102·3
Gerlach	5	113·4	53	6·7	36·0	101·8
Leader B	5	113·6	53	7·2	35·5	101·8
Danish Island	5	114·0	53	6·9	33·6	101·2
Prolific, Ottawa 79	5	115·3	53	6·7	35·5	96·1
Gold Rain	5	111·4	56	7·6	37·6	95·2
Irish Victor P	5	119·9	56	7·2	35·5	95·2
Longfellow, Ottawa 478	5	110·3	52	7·0	36·8	94·4
Victory	5	114·1	52	7·5	37·4	94·1
Alaska	5	105·3	46	8·5	38·4	83·0
Leader A	5	107·0	50	7·9	34·1	81·6
Richland	3	109·8	39	8·0	33·2	96·2
O.A.C. 144	3	121·7	55	6·7	33·3	94·4
Markton	3	121·3	49	6·2	35·5	91·5
O.A.C. 3	3	111·4	46	8·0	33·0	87·0
White Cross	3	109·7	48	6·7	32·7	75·8
Laurel, Ottawa 474	3	112·4	48	8·8	49·3	74·5
Cole	3	108·8	43	7·8	33·5	73·3

Banner has proved the highest yielding variety of oats on irrigated land, and since it has good strength of straw it is the variety recommended under irrigated conditions. Leader is a variety of the side-head type and is also a good yielder. Legacy and Kherson are two of the best early varieties. Gerlach is a variety which is grown to a considerable extent in Saskatchewan, where it is giving good results. Victory generally produces grain of an exceptional quality on irrigated land, but its yield has been surpassed by many of the more important varieties. Alaska has been the earliest variety tested and almost the lowest yielding one.

Richland, White Cross and Cole are three early varieties, tested for only a three year period. The first of these has proved a fair yielder, but the yield of the other two has been rather low. O.A.C. 144 and O.A.C. 3 are two new strains which originated at the Ontario Agricultural College. Markton is a new variety which was imported from Montana. Laurel has been the best hulless variety tested.

AVERAGE RESULTS FOR PAST FIVE-YEAR OR THREE-YEAR PERIOD OF VARIETIES OF BARLEY TESTED IN ROD-ROW PLOTS (IRRIGATED LAND)

Variety	Number of years under test	Number of days maturing	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre
			in.		lb.	bush.
Bearer, Ottawa 475	5	107·9	45	6·3	49·5	73·5
Hannchen	5	107·4	41	6·2	52·6	72·4
O.A.C. 21 (Sask. Sel.)	5	101·4	44	6·5	51·6	72·3
O.A.C. 21	5	101·3	47	6·8	52·4	71·0
Charlottetown 80	5	108·2	41	7·3	54·6	69·4
Chinese, Ottawa 60	5	101·8	45	6·9	52·9	68·1
Star	5	99·7	39	8·1	51·1	66·2
Himalayan, Ottawa 59	5	102·2	36	6·7	63·5	61·9
Swedish Chevalier	5	110·4	40	5·3	52·9	61·0
Junior, Ottawa 471	5	100·5	34	6·9	59·5	57·8
Duckbill, Ottawa 57	5	106·8	42	9·1	53·4	55·4
Early Chevalier, Ottawa 51	5	100·1	44	7·2	54·1	51·8
Canadian Thorpe	3	107·8	44	8·4	52·8	75·6
Trebi	3	108·4	34	6·4	48·5	72·3
Horn	3	110·8	42	5·6	54·7	71·2
Velvet	3	105·5	46	7·9	50·3	70·6
Bark's	3	115·4	40	6·8	43·7	66·5
Cape	3	105·7	40	5·5	46·2	60·4
Smith's	3	113·8	46	5·9	51·2	57·8
Mariout	3	109·6	31	4·9	46·7	45·2

Bearer, a six-rowed variety, has been the heaviest yielder of the varieties tested for the five year period. The quality of the grain produced, however, has been somewhat low, as indicated by the fact that its weight per measured bushel has been lower than that of all other varieties tested for five years. Hannchen has been found one of the best varieties of the two-rowed type. O.A.C. 21 compares more favourably in yield with other varieties on irrigated land than it does on dry land.

A few of the varieties which have been tested for only three years appear more promising than those varieties which have been tested longer. Canadian Thorpe has been the highest yielder of the two-row type, and it possesses good length and strength of straw. Trebi is the highest yielding six-rowed variety of those in the three year test. Horn is one of the two-rowed type, imported from Montana, and on account of the high yield, along with a low per cent of hull, it is one which should prove valuable for feeding. Bark's is the latest maturing variety under test, and one which gives much better results under irrigation than under dry land conditions.

PEAS

Nine varieties of field peas were under test on irrigated land. These were grown in small plots of five rows each, one rod in length and seven inches apart. A space of six feet was left between plots to prevent the vines from becoming mixed. It was not feasible to remove the outside rows on account of the tangling of the vines, so the whole five rows were harvested. The yield of the entire plot, however, was greatly increased on account of the vacant space adjoining it on either side. In order to take this border effect into consideration in computing the yields, the plot was considered as extending three feet wider on either side, making the dimensions 16·5 feet by 9 feet. Seeding was done by hand on May 11, at the rate of three bushels per acre in all cases. The land on which the tests were conducted had grown corn the previous season. One irrigation was given on July 11.

PEAS—TEST OF VARIETIES (IRRIGATED LAND)

Variety	Number of days maturing	Colour of flowers	Yield per acre				
			1926	1927	1928	1929	Average
			bush.	bush.	bush.	bush.	bush.
Prussian Blue	135·9	White	47·00	52·94	56·96	67·90	56·20
Mackay, Ottawa 25	136·7	White	62·30	40·49	48·61	65·50	54·20
Chancellor, Ottawa 26	135·1	White	47·50	40·49	49·70	55·40	48·27
Arthur, Ottawa 18	134·1	White	49·30	38·81	44·85	46·30	44·82
Cartier, Ottawa 19	137·2	White	46·00	41·25	36·64	54·00	44·47
Solo	137·0	Purple	39·50	41·10	43·81	50·90	43·83
English Grey	138·95	Purple	32·00	37·59	47·07	56·90	43·39
Golden Vine	140·00	White	32·80	16·62	26·70	48·80	31·23
*O.A.C. 181	134·75	White	.....	41·02	55·37	54·90	50·43

*Grown only three years.

The Prussian Blue variety has been the highest yielding one under test. Mackay is also a high yielder, and one's preference for either a blue or white variety should be a deciding factor in choosing between these two varieties. Chancellor produced grain which is much smaller in size than that of the above two varieties, and it has been found a good yielder. Arthur and Cartier both produce grain that is large and white in colour. O.A.C. 21, during the three years that it has been under test, has proved a good yielding variety.

Ten varieties of canning peas were also grown for comparison, but a report on their yields will not be given until they have been tested further.

FIELD BEANS

Field beans have proved a satisfactory crop in many districts in the United States for growing in conjunction with sugar beets. Both crops can be seeded with the same machinery. Beans can be seeded soon after the seeding of sugar beets is completed, and the harvesting of them takes place before the harvesting of sugar beets begins. The average growing season in the Lethbridge district, however, is too short for the best varieties of field beans to be grown with safety. Further experimenting is necessary before the crop can be recommended as a safe or satisfactory one for the district. There is a good local demand for beans of the small white type but these are considerably later than those of the large coloured varieties. The price paid for coloured beans is also somewhat lower than that paid for white beans.

The table following shows the results obtained from three season's tests with different varieties. Seeding was done in the first two seasons with an ordinary two-row corn planter. This implement proved quite satisfactory for

the seeding of beans, but as the varieties tested varied greatly in size it was considered that they could be more accurately seeded by hand. Hand seeding, therefore, was practised in 1929. Varieties were seeded in single rows one rod long and spaced twenty-two inches apart. All varieties were replicated nine times and their yields were determined by averaging the results from the ten different plots. The ordinary beet drill is a suitable implement for seeding beans, but if the variety used is larger than the ordinary pea bean a plate longer than that used for the seeding of sugar beets should be used.

Thirteen varieties were under test in the three seasons 1925, 1926 and 1929, and they are arranged in the table in order of their average yield for these three years. They were seeded on May 13 and harvested about the middle of September. The rate of seeding was approximately two bushels per acre in all cases. One irrigation was given on July 12.

BEANS—TEST OF VARIETIES (IRRIGATED LAND)

Variety	Number of days maturing	Colour and size of bean	Yield per acre			
			1925	1926	1929	Average
			bush.	bush.	bush.	bush.
Luther Burbank	118·2	White, small	46·10	45·40	33·60	41·70
Great Northern	123·2	White, medium	36·00	31·60	48·25	38·62
Australian Brown	117·2	Brown, large	43·86	32·30	36·45	37·54
Imperial Pea Bean	119·7	White, small	38·75	38·70	32·18	36·54
Michigan Early Wonder	118·3	White, small	35·57	42·90	29·03	35·83
Lady Washington	119·2	White, medium	34·17	34·90	36·60	35·22
Robust	119·7	White, small	30·47	30·60	39·15	33·41
Kotenashi	119·9	White, small	27·29	39·70	31·65	32·88
Yellow 6 Weeks	115·2	Yellow, large	32·50	31·50	34·05	32·68
Beauty, Ottawa 712	117·7	White with brown spot, medium.	28·54	32·40	34·89	31·94
Navy, Ottawa 711	118·1	White, large	20·37	37·20	31·73	29·77
Meyer	120·2	White, small	21·25	37·10	27·98	28·78
Large White, Ottawa 713	119·4	White, large	21·67	30·60	29·48	27·25

Luther Burbank is the highest yielding variety of the small white type, and from the standpoint of earliness and baking qualities also it appears to be the one most worthy of recommendation. Great Northern outyielded it to a considerable extent this year, on account of the season being more favourable for ripening the later maturing varieties. It is the most popular variety in the bean-growing districts of Montana, but has been found entirely too late for Southern Alberta. It was the only variety which showed any appreciable amount of damage from frost this season. Other varieties which should be chosen, if seed of Luther Burbank is not available, are Imperial Pea Bean, Michigan Early Wonder, Lady Washington, and Robust Pea Bean.

FORAGE CROPS

The season was more favourable than usual for obtaining a stand of the different classes of forage crops. No injury occurred from soil drifting and frequent rains kept the soil moist to the surface. Cool weather continued, however, until the last week in June so that the growth was retarded. The warm weather which commenced at that time, and continued throughout July and August, produced a rapid growth of all crops. Corn and other crops, which require a long growing season, produced heavy yields, but were more immature at the time of harvesting than they are in most seasons. Alfalfa, and other hay crops, produced two good cuttings, and these were practically the only forage crops that required irrigating.

Hoed crops required a great deal of cultivation and hand work to keep them free from weeds, and this was one of the greatest difficulties that the growers of sugar beets had to contend with. In a few cases in the early summer, weeds became so bad that they took possession of the land.

Four degrees of frost occurred in the night of September 6, which did a small amount of damage, but crops which escaped this frost were free to grow until September 28, when sufficient frost occurred to check practically all plant growth. Scarcely any of the corn in the district was sufficiently far advanced to escape any injury from this early frost, and the Provincial Corn Show, which was to be held in Lethbridge, was cancelled on account of the unfavourable season.

TESTS CONDUCTED ON DRY LAND

CORN

Seventeen varieties of corn for ensilage purposes were seeded on May 8 in quadruplicate 1/200-acre plots, on summerfallowed ground. An ordinary two-row corn planter was used for seeding, spacing the rows three feet apart. On June 20 the plants were thinned to ten inches apart in the rows, to provide the same thickness of stand for all varieties. Harvesting of all varieties was done on September 27, and the yield per acre of dry matter was determined by putting a small portion from each row harvested through a cutting-box, and drying a two-pound sample from it, in an oven, until all the moisture was evaporated. The stage of maturity attained by the different varieties is indicated in the table, and attention is here drawn to the foot-note concerning this.

CORN—TEST OF VARIETIES (DRY LAND)

Variety	Source	Height of plant at harvest	Maturity at harvest	Yield per acre green weight	Yield per acre dry matter	Per cent dry matter	Average yield dry matter for past two years
		ft. in.		tons lb.	tons lb.	%	tons lb.
White Flint	Northland Seed Co., Sydney, Montana.	4 3	Ripe	11 800	3 193	27·16	1 1,765
Twitchell's Pride	C.E.F., Ottawa	5 2	Ripe	11 400	3 407	28·60	1 1,709
Gehu	Disco	4 8	Ripe	9 850	2 1,648	29·96	1 1,562
Pride Yellow Dent	Disco	6 3	Late milk	12 100	2 1,177	21·48	1 1,418
Longfellow	J. O. Duke	6 4	Early milk	11 1,025	2 1,187	22·61	1 1,409
Silver King	Disco	6 2	Late milk	12 1,700	2 1,546	21·58	1 1,387
Burr Leaming	Carter	6 8	Early milk	10 1,800	2 723	21·66	1 1,235
Leaming No. 9	J. O. Duke	6 3	Milk	10 750	2 551	21·95	1 1,110
Quebec No. 28	Macdonald College, Que.	4 9	Ripe	8 250	2 861	29·91	1 1,008
N. W. Dent	Lethbridge strain	4 4	Ripe	5 1,025	2 123	37·40	1 915
Minnesota No. 13	(Haney O. Will strain)	5 2	Ripe	7 0	2 273	30·52	1 876
N. W. Dent, Brandon	Brandon	4 7	Almost ripe	5 1,250	2 491	39·92	1 867
Minnesota No. 13 Double Cross.	O. Will	4 6	Ripe	5 133	1 1,683	36·35	1 539
Manitoba Flint	Man. Agric. College	3 10	Ripe	4 1,350	1 1,755	40·16	1 392
Payne's White Dent	J. M. Buckley	5 0	Dent	9 1,800	3 633	33·50	
N. W. Dent Minnesota		6 1	Almost ripe	7 1,400	2 444	28·86	
King's Cross		5 0	Dent	6 1,250	2 279	32·29	

NOTE.—The term "ripe" as used in the table indicates that at least 90 per cent of the ears contained hard corn that would make satisfactory seed by storing in a dry place, free from frost, but does not mean the same degree of maturity that is implied in speaking of ripe corn in a district where corn is commonly grown for grain.

The table preceding shows the percent dry matter, yield per acre in green weight, and dry matter for 1929, and the average yield in dry matter of the varieties that have been grown for the past two seasons. These two seasons were unfavourable for corn and under such conditions varieties such as the three at the top of the list generally give best results. Each gives a fair yield of fodder, and in most seasons reaches a high degree of maturity. They, along with Howes' Alta. Flint, which is not included in the table, are recommended for hogging-off purposes, or for parts of the district where the season is too short to permit of corn being grown to good advantage. The next five varieties in the table always give high yields in green weight per acre, but never become

well matured, even in most favourable seasons. Northern-grown strains of North Western Dent, or strains which have been selected for earliness and other desirable features, such as the Lethbridge Brandon strains, still appear to be most satisfactory for ensilage purposes. The Haney strain of Minnesota No. 13 is also a good variety for this purpose and Payne's White Dent, while it was grown this year for the first time, gave excellent results, and appears promising.

TESTS CONDUCTED ON IRRIGATED LANDS

CORN

There were thirty-six varieties of corn under test for grain and ensilage purposes. These were all seeded on May 7 in quadruplicate 1/200-acre plots with an ordinary two-row corn planter. The rows were spaced three feet apart. The rotation in which the tests were conducted is a three-year one, consisting of grain, corn, and peas. All varieties were seeded thickly, and when the plants were about four inches in height they were thinned to approximately ten inches apart, in order that the same stand might be obtained in all cases. The per cent dry matter was determined by drying in an oven a two-pound sample from each row harvested, until all the moisture had been expelled, and reweighing. All plots were irrigated on July 12, and harvested on September 9. The degree of maturity attained by the different varieties is indicated in the table, and attention is drawn to the footnote in connection with this point.

CORN—TEST OF VARIETIES (IRRIGATED)

Variety	Source	Height of plant at harvest	Maturity at harvest	Yield per acre green weight	Yield per acre dry matter	Per cent dry matter	Average yield dry matter for past two years
		ft. in.		tons lb.	tons lb.	%	tons lb.
Gehu	Disco	4 7	Almost ripe	15 1,000	4 1,647	31·12	5 725
White Flint	Northland Seed Co., Sydney, Mont.	4 5	Glazed	18 1,500	4 1,574	25·55	5 208
Mercer Flint	Northrup King	6 11	Milk	24 250	5 1,201	23·21	4 1,785
N.W. Dent Disco	Disco	6 3	Dent	19 1,467	4 1,847	24·95	4 1,756
Mandan King	O. Will	5 6	Glazed	18 1,800	5 458	27·67	4 1,661
Quebec No. 28	Macdonald College, Que.	5 0	Almost ripe	12 1,667	4 436	32·80	4 1,482
Silver King	A. C. Popp	7 10	Milk	22 1,950	4 1,634	20·97	4 1,354
Silver King	Disco	7 3	Milk	22 500	4 1,690	21·33	4 1,288
Twitchell's Pride	C.E.F., Ottawa	5 8	Glazed	19 1,700	4 1,746	24·55	4 1,221
N. W. Dent, Crookston	Crookston	6 9	Late dent	19 700	5 180	25·09	4 590
Minnesota No. 13 Haney Strain	O. Will	6 5	Late dent	14 1,750	4 1,330	31·36	4 390
Pride Yellow Dent	Disco	7 0	Late milk	23 500	5 953	23·55	4 352
Wisconsin No. 7	J. O. Duke	7 6	Milk	18 850	4 689	23·55	4 212
Compton's Early	J. O. Duke	6 5	Milk	20 690	3 1,937	19·70	4 137
N. W. Dent	Lethbridge strain	5 4	Almost ripe	12 1,850	4 1,027	34·92	4 30
N. W. Dent O. Will	O. Will	6 0	Late dent	16 300	3 1,695	23·82	3 1,854
Manitoba Flint	Man. Agric. College	4 6	Almost ripe	10 1,550	3 766	31·40	3 1,848
Longfellow	J. O. Duke	7 6	Milk	17 1,900	3 1,517	20·95	3 1,750
Leaming No. 9	J. O. Duke	7 7	Milk	19 950	3 1,951	20·41	3 1,518
Falconer	O. Will	5 0	Late dent	12 600	4 300	33·74	3 1,434
Minnesota No. 13 Double Cross	O. Will	6 3	Dent	17 933	4 823	25·26	3 1,300
Burr Leaming	Carter	7 6	Ears formed	22 1,800	4 169	17·84	3 1,282
Assiniboine Yellow	O. Will	4 6	Late Flint	13 1,200	3 841	25·15	3 1,216
Square Deal	O. Will	5 3	Late dent	13 667	3 1,176	26·91	3 1,187
N. W. Dent, Brandon	Brandon	5 5	Almost ripe	12 1,050	3 1,899	31·62	3 1,155
Brown County Dent	Northland Seed Co., Sydney, Mont.	5 8	Late dent	11 500	3 1,920	35·20	3 904
N. W. Dent, Brooks	Brooks	5 2	Almost ripe	11 1,550	3 1,579	32·19	3 702
Bailey	J. O. Duke	8 0	Milk	17 67	3 955	20·41	3 732
Manalta	Man. Agric. College	3 6	Ripe	7 1,700	3 1,140	45·48	3 497
White Cape Yellow Dent	J. O. Duke	7 7	Milk	17 1,600	3 647	18·67	3 463
Howe's Alta. Flint	Lethbridge	2 11	Ripe	5 50	2 1,320	52·93	2 1,450
Payne's White Dent	J. M. Buckley	6 4	Late dent	19 1,800	5 522	26·44	
N.W. Dent, Minnesota Grown	Minnesota	6 10	Milk	18 467	4 1,151	25·09	
Falconer	A. E. McKenzie	5 2	Late dent	15 850	4 707	28·22	
King's Cross		5 11	Almost ripe	12 1,600	3 634	25·91	
Duncan's White Flint	Alta	2 9	Ripe	6 200	2 1,413	44·37	

NOTE.—The term "ripe" as used in the table indicates that at least 90 per cent of the ears contained hard corn that would make satisfactory seed by storing in a dry place, free from frost, but does not mean that the same degree of maturity that is implied in speaking of ripe corn in a district where corn is commonly grown for grain.

The preceding table shows the yields in green and dry weight per acre of the different varieties tested in 1929, and the average yield of dry matter of all varieties tested for the past two years.

The column indicating the "maturity at harvest" shows that three varieties, Manalta, Howes' Alta Flint, and a strain of white Flint obtained locally and known as Duncan's White Flint, were the only ones to ripen. These are best adapted for grain or for hogging-off, and are the ones recommended for these purposes, especially wherever the season is subject to early fall frosts. The Manalta variety is only a few days later than Howes' Alta Flint, and produces a considerably higher yield of yellow flint corn, similar to that of Howes' Alta Flint, Gehu, White Flint, Quebec 28, Twitchell's Pride, and Manitoba Flint, yields considerably more fodder than any of the three varieties mentioned above, and in average seasons produces a fair percentage of well-matured ears. On account of the increased yield from the varieties in this group, and the uncertainty of the weather, it is advisable, whenever any appreciable acreage is seeded, to devote a certain proportion to one of the varieties of this group, and the balance to Manalta or Howes' Alta Flint. Those varieties which seem best suited for ensilage purposes are the Northern-grown strains of North Western Dent, and the Haney strain of Minnesota No. 13, on account of their yield and maturity. Payne's White Dent was grown this year for the first time and gave excellent results under both dry land and irrigated conditions. Where a high yield of ensilage is desired, but not necessarily ensilage with a high feeding value, varieties such as Silver King, Wisconsin No. 7, Compton's Early, Longfellow, Leaming No. 9, and Burr Leaming, can be recommended.

DATES OF SEEDING CORN FOR ENSILAGE PURPOSES

An experiment has been conducted, on irrigated land, for the past two seasons to determine the best time to seed corn for ensilage purposes. A strain of North Western Dent, which has been grown at the Station for the past six years, and improved somewhat by selecting for earliness and other desirable features, has been used in this experiment. Plots $\frac{1}{200}$ acre in size have been seeded in quadruplicate, at intervals of ten days, the first seeding being made on April 20. Yields of green weight and dry matter per acre have been determined as in the case of the variety tests.

DATES OF SEEDING CORN FOR ENSILAGE PURPOSES

Dates of seeding	Height of plant at harvest		Stage of maturity at harvest	Yield per acre green weight		Yield per acre dry matter		Percentage dry matter	Average yield acre dry matter 1928–1929	
	ft.	in.		tons	lb.	tons	lb.		tons	lb.
April 20	4	11	Ripe	7	120	3	820	48·3	2	1,690
May 1	5	2	Ripe	7	1,349	3	1,209	47·0	2	1,405
May 10	5	2	Ripe	8	835	3	1,735	46·0	2	1,240
May 20	5	3	Ripe	9	202	3	1,146	39·2	2	1,452
June 1	5	7	Dent	9	903	3	1,922	41·9	2	1,571

SUNFLOWERS

Excepting for a small portion in the western and northern parts of the district sunflowers are not an important crop. Wherever corn can be relied upon to give a fair annual return as ensilage, it is chosen in preference to sunflowers. Three varieties have been grown for the past two years for comparison

with the more important varieties of corn, for ensilage purposes, and their average yield per acre in dry matter has been as follows:—

Mammoth Russian (Disco)..... 7 tons, 1,121 pounds per acre.
Ottawa No. 76 (C.E.F. Ottawa)..... 4 tons, 873 pounds per acre.
Mennonite (Rosthern, Sask.)..... 2 tons, 477 pounds per acre.

These yields are appreciably higher than those obtained from corn varieties, and were it not for the unpalatability of sunflowers there would be good reason for growing them in preference to corn.

SUGAR BEETS

An experiment is being conducted in dates of seeding of sugar beets, which will be reported upon when it is completed. Beets are seeded as early as possible in the spring, and at ten-day intervals continuing until June 10. The purpose of the experiment is not only to determine the best date of seeding sugar beets for the maximum yield, but also to find how late in the season re-seeding should be practised, in cases where the first seeding has not proved satisfactory.

Variety tests are also being conducted annually, and samples of each variety are sent to the Chemistry Division at Ottawa for analysis as to their sugar content.

KALE AND RAPE—TEST OF VARIETIES

Six varieties of kale were grown for comparative purposes in quadruplicate plots. Seeding was done by means of a Planet Junior, in rows seven inches apart, and a good stand was obtained in all cases. The plants were thinned to three inches apart in the row. One irrigation was applied on June 12, and harvesting was done on September 26.

KALE AND RAPE—TEST OF VARIETIES (IRRIGATED)

Variety	Yield per acre green weight		Yield per acre dry matter		Percentage Dry matter
	tons	lb.	tons	lb.	
Purple Stemmed Marrow	40	216	5	1,736	14·63
Green Stemmed Marrow	36	1,420	5	754	14·63
1000 Headed	38	86	5	659	14·01
Improved 1000 headed	31	1,560	5	267	16·15
Giant Rape	31	628	4	803	14·06
Sheep Kale	24	1,120	3	1,878	16·04

FIBRE CROPS

HEMP

An experiment was conducted in rates of seeding of hemp for fibre. One-sixtieth acre plots were seeded in duplicate, at the following rates: 50 pounds, 60 pounds, and 70 pounds per acre. Seeding was done on May 21 by means of a Planet Junior. One irrigation was given on July 14, and all plots were harvested on September 12.

RATES OF SEEDING HEMP FOR FIBRE, 1929

Rate of seeding per acre	Average yield of retted straw per acre	Per cent fibre	Average yield of fibre per acre
lb.	tons lb.	%	lb.
50	2 1,190	16·49	856
60	2 1,970	16·49	984
70	2 1,880	16·49	970

The table shows the yield of retted straw, obtained from the different plots, as determined by weighing it after it had remained spread thinly on the ground all winter. A sample of one hundred pounds from one of the plots was sent to the Division of Economic Fibre Production for determination of the per cent of fibre. The per cent of fibre in the sample formed the basis for computing the amount of fibre produced on the other plots. The sample was not considered by the Fibre Division to be very satisfactorily retted.

To determine the possibilities of retting hemp by irrigation, a sample of about one hundred pounds was spread on a piece of low-lying ground where it was flooded with irrigation water twice in the fall, and left spread out until spring. This sample was then sent to the Fibre Division for comparison with the sample that had been retted naturally, and for fibre determination. It was considered to be sufficiently retted, which indicates that fall irrigating may possibly be found the best means of handling the retting phase of hemp growing.

FLAX FOR FIBRE PRODUCTION

An experiment in rates of seeding was also carried out with flax, for both fibre and seed production, the rates used being 84 pounds, 98 pounds, and 112 pounds per acre. Seeding was done in one-sixtieth acre plots, in duplicate, on May 21, with a Planet Junior. One irrigation was given on July 14, and harvesting was done on August 31.

RATES OF SEEDING J.W.S. FLAX FOR FIBRE AND SEED, 1929

Rate of seeding per acre	Average weight of retted straw	Per cent fibre	Average yield of fibre per acre	Average yield of grain per acre
lb.	tons lb.	%	lb.	lb.
84	1 1,540	16·22	574	927
98	1 1,600	16·22	584	825
112	2 50	16·22	657	810

NOTE.—Yield of grain per acre was determined from the weight of the samples as they came from the threshing machine.

The table shows an increase in yield of fibre, but a decrease in yield of seed, as the rate of seeding was increased.

FIELD HUSBANDRY

DRY LAND CROP ROTATIONS

The crop season of 1929 was characterized by a liberal supply of moisture during April, May and June, and a decidedly limited supply during July and August. This fact may be in some way related to the unusual condition of spring ploughed fields producing grain of better grades and in some cases a higher yield than was the case on summer-fallow. It is interesting to note that all rotation fields with the exception of corn on rotation " F " (blown soil) returned a profit over production cost. The highest profit per acre was returned from winter wheat on rotation " T " where a profit over operating cost of $34.82 was realized. This field however only shows a profit over costs of $7.32 over a period of eighteen years. Considering the results from the standpoint of average profit from rotations, all rotations returned a profit ranging in value from $5.01 in the case of rotation " F " to $14.27 from rotation " J ". The second highest profit of $11.39 was realized from rotation " C ", a three-year rotation of summer-fallow, wheat, wheat. This rotation has returned a profit of $6.68 over a period of eighteen years, which is the highest average return of any of the rotations under way.

Rotation " B ", where wheat follows summer-fallow in alternate years, the rotation profit for 1929 was $9.68, with $5.46 for the eighteen years average.

METHODS OF ARRIVING AT COST VALUES

Previous to this year the time cost used in computing the results from these rotations has been arrived at by employing the actual time required by men and horses or tractor to do each operation in the production of the crop. Due to the use of small fields, not all of which are of the same shape, it has been found that some rotations are being penalized as compared with other rotations whose shape lent to more economical use of time in their cultivation. In order to avoid this discrepancy, which is due purely to the particular shape of the field rather than to any comparative values in the rotation procedure, it has been decided to establish a standard set of time values for each operation. These values represent the average time required for the various operations as actually recorded under farming conditions over a period of five years in various parts of Alberta, and represent a fair conservative time in which to expect to accomplish each operation per acre.

STANDARD TIME REQUIRED FOR FARM OPERATIONS, EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA, 1929

Operations	Time per acre	
	hr.	min.
Ploughing with one-bottom plough—1 man, 3 horses	4	..
Ploughing with two-bottom plough—1 man, 5 horses	2	15
Double disking—1 man, 4 horses	1	5
Cultivating—1 man, 4 horses	..	40
Seeding—1 man, 4 horses	..	35
Harrowing—1 man, 3 horses	..	22
Cutting with binder—1 man, 4 horses	..	40
Mow hay—1 man, 2 horses	1	..
Rake hay—1 man, 2 horses	..	35
Planting corn—1 man, 2 horses	1	15
Cultivate corn—1 man, 2 horses	2	..
Harvest corn with corn binder—1 man, 3 horses	2	..
Stooking—1 man	1	15
Coiling hay—1 man	1	15
Hoeing, 1 man	Actual time	

ROTATIONS

Field "A," which had been in wheat continuously for eighteen years, produced 13·54 bushels and returned a profit over costs of $7.46 per acre. Canada thistles which have badly infested portions of this field were controlled to some extent by the use of chemical weed killers.

Rotation "B" produced 30·63 bushels of wheat. This is a two-year rotation with wheat and summer-fallow alternating, and, in common with summer-fallow plots on other rotations, did not produce a grain of as high quality in 1929 as did the wheat on spring ploughed stubble land.

Rotation "C," a three-year rotation, summer-fallow, wheat, wheat, produced 26·52 bushes of wheat on summer-fallow land, and 25·63 bushels on stubble (spring ploughing). This has been the most profitable rotation on the farm over an average of eighteen years.

Rotation "T."—Winter wheat on this rotation came through the winter in excellent condition and yielded 45·93 bushels of good quality grain. The season of 1929 was comparatively favourable to winter wheat, as it is indicated by a yield of spring wheat following corn of only 16·98 bushels. It is interesting to note that the yields of some fields for 1928 were: winter wheat after summer-fallow, 6·04 bushels (winter-killed); spring wheat after corn, 58·23 bushels. The alfalfa seed plots did not set seed in 1929, but a small return was realized from hay.

Rotation "S" gave a yield of 29·87 bushels of wheat on spring ploughing after peas and oats, and only 26·13 bushels after summer-fallow, the wheat on spring ploughing being of superior quality to that from summer-fallow.

Rotation "M" produced a yield of winter wheat of 38·4 bushels. This rotation is designed to provide the necessary feed where live stock is a major project on dry land, winter wheat being the only cash crop.

Rotation "J," as in rotation "S," wheat after wheat on spring ploughing, gave a higher yield than did summer-fallow. Also the wheat from spring ploughing was of a decidedly better grade. This unusual condition in the 1929 crop on the dry land rotations is possibly due to the fact that the summer-fallow fields produced a very heavy growth early in the season, which could not be supported during the drought of July and August, so that the grain produced was comprised of leaner kernels and in some cases shrunken kernels. This reduced the grade and doubtless the lessened weight per bushel reduced the yield per acre.

Rotation "Z," wheat after summer-fallow, produced 2·5 bushels more than spring ploughing, but the grain was of an inferior quality.

Rotation "F," which is situated on blown soil, continues to yield meagre crops of corn, with wheat and sweet clover giving fair returns.

SUMMARY OF YIELDS AND PROFITS PER ACRE ON DRY LAND ROTATIONS

Rotation "A"—Wheat Continuously

Rotation years	Crop	Yields		Profit or loss (—)	
		1929	Average for 18 years	1929	Average for 18 years
				$	$
1	Wheat (Garnet)	13·54 bush.	13·66 bush.	7 46	4 66
	Field average per acre			7 46	4 66

Rotation "B"—Two Years' Duration

1	Summer-fallow				
2	Wheat	30·63 bush.	27·21 bush.	19 36	10 91
	Field average per acre			9 68	5 46

Rotation "C"—Three Years' Duration

1	Summer-fallow				
2	Wheat	26·25 bush.	26·58 bush.*	14 12	11 24
3	Wheat	25·63 bush.	22·88 bush.	20 06	8 80
	Field average per acre			11 39	6 68

*6 years' average. Previous average for 12 years 38·72 bush. oats.

Rotation "T"—Ten Years' Duration

1	Summer-fallow				
2	Winter wheat	45·93 bush.	27·19 bush.	34·82	7 32
3	Oats	55·26 bush.	47·17 bush.	16 45	8 13
4	Alfalfa seeding			—17 73	—15 43
5	Alfalfa seed	0·98 ton	34·99 lb.	6 73	6 76
6	Alfalfa seed	1·0 ton	28·14 lb.	7 01	6 81
7	Alfalfa seed	0·98 ton	19·92 lb.	23·91	5 10
8	Summer-fallow	1·94 ton			
9	Corn (silage)	4·77 ton	4·75 ton*	1 49	—3 73
10	Spring wheat	16·98 bush.	24·56 bush.	9 76	14 05
	Field average per acre			8 24	2 90

*14 years' average. Previous average for 4 years 16·44 tons turnips.
Hay cut June 20. Profit of $17.18 added to profit from preceding hay crop.

Rotation "S"—Nine Years' Duration

1	Summer-fallow				
2	Corn	7·23 ton	7·37 ton	6 74	—4 98
3	Winter rye	22·71 bush.	23·0 bush.*	10 55	13 51
4	Summer-fallow				
5	Wheat	26·13 bush.	26·90 bush.	9 80	6 92
6	Oats	58·59 bush.	43·45 bush.	16 63	6 10
7	Summer-fallow				
8	Peas and oats	1·78 ton	2·13 ton	3 74	—1 70
9	Wheat	29·87 bush.	27·06 bush.	23 17	4 39
	Field average per acre			7 35	2 69

*6 years' average. Previously used as pasture.

ROTATION "M"—SIX YEARS' DURATION

Rotation years	Crop	Yields		Profit or loss (—)	
		1929	Average for 18 years	1929	Average for 18 years
				$	$
1	Summer-fallow				
2	Winter wheat	38·4 bush.	26·58 bush.	24 88	6 32
3	Oats	58·82 bush.	45·26 bush.	16 24	6 73
4	Summer-fallow				
5	Peas and oats	1·95 ton	2·25 ton	5 95	0 19
6	Oats	49·65 bush.	50·87 bush.	14 17	8 28
	Field average per acre			10 21	3 59

ROTATION "J"—SIX YEARS' DURATION

—	—	—	Average for 8 years	—	Average for 8 years
1	Summer-fallow	2·19 ton*			
2	Wheat	19·83 bush.	30·13 bush.	13 01	10 47
3	Wheat	27·67 bush.	24·79 bush.	20 29	11 03
4	Oats (rye grass and alfalfa seeded)	45·20 bush.	33·06 bush.	11 86	4 76
5	Hay	1·58 ton	0·98 ton	11 89	—0 22
6	Hay or pasture	1·31 ton	1·16 ton	28 55	4 93
	Field average per acre			14 27	5 16

*Hay, cut June 15, previous to ploughing. Profit from hay $20.37, added to profit from preceding hay crop.

ROTATION "Z"—FIVE YEARS' DURATION

—	—	—	Average for 8 years	—	Average for 8 years
1	Summer-fallow				
2	Wheat	26·33 bush.	28·75 bush.	10 23	7 75
3	Wheat	23·83 bush.	31·33 bush.*	14 79	7 41
4	Sweet clover seeded			—9 65	—8 33
5	Hay or pasture	1·70 ton	1·21 ton	11 23	2 62
	Field average per acre			5 32	1 89

*Four years' average. Previous average for four years 21·69 bush. oats.

ROTATION "F"—THREE YEARS' DURATION

—	—	—	Average for 3 years	—	Average for 3 years
1	Corn	0·74 ton	0·83 ton	—7 92	—9 91
2	Wheat	19·00 bush.	26·55 bush.	14 02	17 47
3	Sweet clover	1·30 ton	1·87 ton	8 94	5 21
	Field average per acre			5 01	4 26

DRY LAND CULTURAL WORK

The outline of the work with cultural rotations is given in the 1928 report of this Station. This includes work comparing "standard" and "ploughless" summer-fallow, various stubble treatments, and also the use of sweet clover in bringing badly drifted soil back into profitable production. This being the second year that these trials have been run the data are not as yet sufficiently reliable for publication.

SUMMER-FALLOW SUBSTITUTES

A group of trials on summer-fallow substitutes were conducted at the Station from 1917 to 1928, when they were discontinued and the land used for commercial fertilizer trials. The results of the work are published in the 1928 report of this Station.

CROP ROTATIONS ON IRRIGATED LAND*

Rotation "U" was established on the irrigated part of the Station in 1912 and rotation "X" was established in 1915. One-acre plots are used in each of these rotations, both have alfalfa as a base, and receive an application of 12 tons of manure per acre once in the rotation cycle.

Rotation "U" is a ten-year rotation of six years alfalfa and one year each of sugar beets, wheat, oats, and barley in the order named. Alfalfa is seeded with barley as a nurse crop. The manure is applied to the alfalfa in the fall one year before the field is broken for sugar beets.

Rotation "X" is arranged somewhat differently. Alfalfa occupies two-thirds of the rotation and one-third is in other crops. A field of alfalfa is not broken each year as with rotation "U," but one-half of the alfalfa area is broken every five years and the same year alfalfa is seeded with each of the annual crops except corn. The corn field is seeded to alfalfa the following year. The annual crops are rotated among themselves as shown in the summary table. Manure is applied on the barley stubble preceding the corn.

The yields of wheat, oats, barley, and sugar beets were exceptionally good on rotation "U" this year, being the best ever obtained on this rotation, and again emphasizes the possibility of keeping the irrigated lands of southern Alberta at a high state of productivity by following a satisfactory crop rotation and occasionally applying manure. Yields of over 68 bushels of wheat, 127 bushels of oats, and 91 bushels of barley per acre after eighteen years of continuous cropping are very encouraging and evidences the possible permanency of irrigation farming when proper methods are employed. Another pleasing feature of this rotation is the effectiveness of the alfalfa and cultivated beet crop in keeping Canada thistles and wild oats under control.

The yields on Rotation "X" were not very good this year. This field is located on a part of the Station farm difficult to reach with the irrigation water, and as water was scarce during the driest part of the summer it was used on parts of the Station where it could be applied more effectively. This resulted in the crops on Rotation "X" being badly burned before the water was applied which caused the low yields. Where the crops did not suffer for water the production was good.

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

SUMMARY OF YIELDS AND PROFITS PER ACRE ON IRRIGATED ROTATIONS

Rotation "U"—Ten Years' Duration

Rotation year	Crop	Yields		Profit or loss (—)	
		1929	Average for 18 years	1929	Average for 18 years
				$	$
1	Alfalfa	1·90 ton	2·02 ton	5 46	7 37
2	Alfalfa	3·29 ton	3·53 ton	29 71	23 86
3	Alfalfa	4·61 ton	3·88 ton	48 02	27 93
4	Alfalfa	3·84 ton	3·92 ton	37 46	29 05
5	Alfalfa	2·97 ton	3·99 ton	25 52	29 37
6	Alfalfa	3·16 ton	4·30 ton	27 77	31 77
7	Sugar beets	17·24 ton	†13·30 ton	83 11	‡114 83
8	Wheat	68·33 bush.	48·14 bush.	57 67	29 34
9	Oats	127·90 bush.	93·22 bush.	38 31	18 69
10	Barley	91·10 bush.	55·05 bush.	40 78	12 91
	Field average per acre			39 38	32 51

†Seven years' average of beets.
‡Average profit for potatoes for 11 years $171 and for sugar beets for 7 years $26.57.

Rotation "X"—Fifteen Years' Duration

Rotation year	Crop	Yields		Profit or loss (—)	
		1929	Average for 15 years	1929	Average for 15 years
				$	$
1 to 5	Alfalfa	1·88 ton	2·68 ton	9 19	10 39
6 to 10	Alfalfa	2·38 ton	2·95 ton	17 16	22 42
11	Barley	23·80 bush.	42·98 bush.	—1 82	5 54
12	Corn	1·80 ton	7·06 ton	—23 77	—1 67
13	Wheat	34·30 bush.	37·76 bush.	21 76	19 84
14	Oats	35·70 bush.	64·50 bush.	0 99	7 14
15	Peas	7·90 bush.	20·93 bush.	—4 77	18 95
	Field average per acre			8 28	14 26

MANURING EXPERIMENTS AND SMALL PLOT ROTATIONS—IRRIGATED

A series of manuring and rotation experiments were started in 1928 on some land that had previously been growing alfalfa and grasses. The purpose of these experiments is to study the effect of manure and rotation practice on the yields of sugar beets, wheat and alfalfa, and to compare the fertilizing value of sweet clover residue when the crop is cut for hay with that of the entire sweet clover crop ploughed under.

The experiments include wheat alternated with summer-fallow without manure; sugar beets continuously with and without manure; three-year rotations of wheat one year and beets two years with and without manure; eight year rotations of alfalfa three years, wheat one year, beets two years and wheat two years with twenty tons of manure applied each year before the beets and the same rotations without manure; and four-year rotations of wheat with sweet clover seeding one year, sweet clover one year and beets two years.

There are three of the sweet clover rotations. One has two crops of sweet clover hay cut and the sweet clover stubble irrigated and fall ploughed without manuring, another receives the same treatment except that fifteen tons of barn-

yard manure are ploughed under with the sweet clover stubble. The sweet clover is not cut on the third rotation but is ploughed under as green manure when the crop starts to bud and the field left fallow the balance of the year.

Each rotation is conducted in duplicate on one-forty-sixth acre plots. The one-forty-sixth acre plot unit was secured when one-twentieth acre plots, used in the previous irrigation experiments, were divided in two by making a ditch through the center of each plot.

The rotations have not progressed sufficiently to cause any noticable difference in yields due to crop sequence but the effect of manure on the sugar beets was decidedly beneficial.

There were ten manured and ten unmanured plots planted to beets in 1929. The average yield of beets for the manured plots was 15·89 tons and for the unmanured plots, 12·29 tons, or a difference of 3·60 tons per acre in favour of the manured plots and while the yields varied from 9·62 tons to 22·74 tons on the manured and 8·10 tons to 17·68 tons per acre on the unmanured land, only three manured plots had yields as low as the average of the unmanured plots and only one of the unmanured plots had a yield as high as the acreage obtained from those manured. Both the increase in crop yields and the appearance of the growing crop show significant benefits derived from the application of barnyard manure.

IRRIGATION EXPERIMENTS

Experiments were started in 1922 for the purpose of studying the stage of plant growth when irrigation water would be most beneficial to field crops. At the close of 1927 the data secured were analyzed and published as Bulletin No. 125 N.S., "Use of Irrigation Water on Farm Crops." Copies of this bulletin may be secured from the Publications' Branch, Department of Agriculture, Ottawa, Ont. It was evident from this analysis that little additional information could be secured by continuing certain of the tests so these were dropped. The others will be continued for another five-year period. (For a complete outline of the experiment as now conducted, see this Station's Annual Report for the year 1928.)

DISCUSSION OF 1929 RESULTS

The rainfall of April, May and June was sufficient to provide all crops with the water needed during those months. A torrential rain on June 1 washed out a number of structures in the main canal of the system that supplies water to the Station, therefore no water was available during the first two weeks of June. This made it impossible to irrigate wheat in the five-leaf stage or alfalfa when 12 inches or 18 inches high.

ALFALFA.—The precipitation received apparently furnished sufficient water for the first crop of hay which was cut July 4, as there were no differences in the yields on the irrigated and unirrigated plots that could be attributed to irrigation.

The second cutting was helped decidedly by an irrigation applied immediately after the first crop was removed, the yields averaging about fifty per cent more than where no water was applied. A second irrigation to the second crop when it was 18 inches high did not increase the yields nor improve the appearance of the plants.

WHEAT.—The best yields of wheat following potatoes were obtained from plots irrigated in the shot blade and flowering stages. The dates these irrigations were applied were June 27 and July 19. The next highest yields were from plots irrigated in the shot blade stage only. The grain showed some drought injury when the irrigation water was withheld until the plants had reached the flowering

stage with the result that the yields were not as good as were obtained from the earlier irrigation, again emphasizing the necessity of irrigating the crop before drought injury occurrs if maximum yields are to be obtained. The plots irrigated in the shot blade or flowering stages were from one to two days later in ripening than adjoining plots.

The same drought injury was apparent on the wheat plots following wheat not irrigated in the shot blade stage or earlier, but the differences in yields were not so significant as on the plots of wheat following potatoes. The reason for this was not apparent.

The plots irrigated at various times and with different numbers of irrigations in 1928 and not irrigated in 1929 showed no differences in appearance of the crop nor in yields that could be attributed to the residual effects of the 1928 irrigations. Apparently any differences in the soil water carried over the winter from the previous year's irrigation were equalized by the rains of April, May and June.

Potatoes.—There seemed to be sufficient moisture in the soil from the April, May and June precipitation to keep potatoes growing normally until August 1. By August 8 the plants showed signs of needing water, but the plots irrigated at that time yielded as well as those irrigated 21 days earlier. After the first week of August the drought injury was increasingly pronounced and many of the unirrigated plots produced less than one-half as much as plots receiving one irrigation. Two or more irrigations did not give any better yields than one applied either at the starting bloom stage nor 21 days later.

The residual effects of the previous year's irrigation was not noticeable on the growing potato plants nor on the yield of potatoes harvested.

Sugar Beets.—The yields of individual plots of beets varied from 19·1 tons per acre on a plot irrigated the previous fall and on June 27, July 25, and August 15 to 11·4 tons on a plot receiving no irrigation. The second largest yield was 18·6 tons from a plot irrigated but once, on July 25. Considering all replicate plots, one irrigation about July 25 seemed to be all that the beets required.

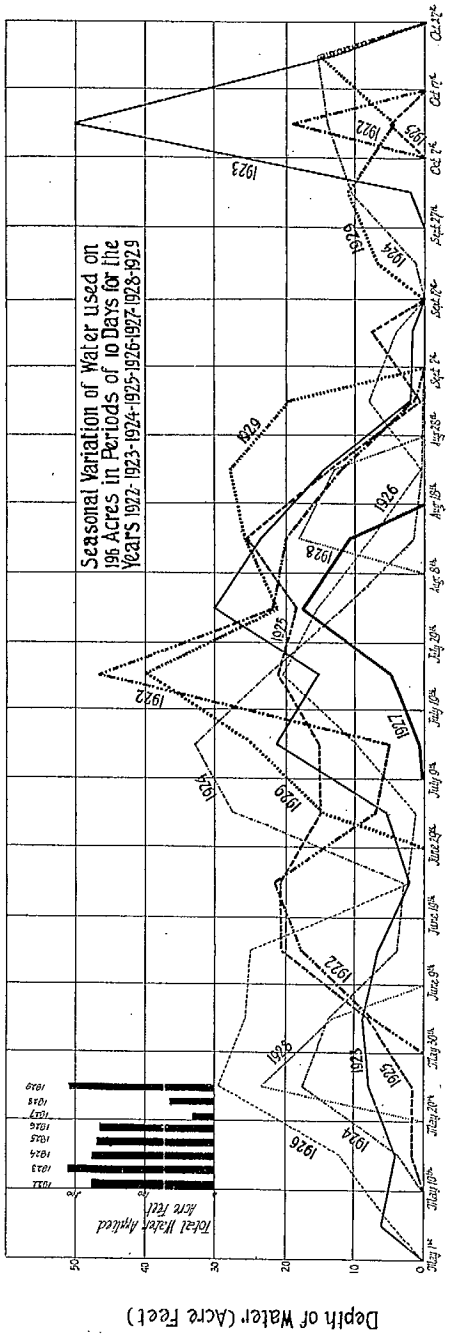
There were no differences in the sugar content of the beets that could be attributed to irrigation treatment.

WATER USED ON THE STATION FARM

All the water used for irrigation on the 190 acres of the Station farm is measured over weirs. The data secured for the last eight years have been converted into acre-feet and the total number of acre-feet used in ten-day periods each year is presented in tabular and graphic form.

Each line on the chart represents the water used in one year and shows the seasonal and yearly fluctuations in irrigation requirements. These fluctations are due principally to two factors, the amount of rain received and the stage of growth of the plants. It will be noted that irrigation commenced between the first and fifteenth of May in four of the eight years and in five years water was used in the period between May 20 and 29. The water used up to the first of June has been employed principally in the irrigation of alfalfa and pastures, the amount required depending largely on the spring precipitation and also on the moisture carried over in the soil from fall rains or fall irrigation of the previous year. In two years only, i.e., 1927 and 1929, were the rains of April and May sufficient to supply the needs of the first crop of alfalfa.

In 1929 there was sufficient rainfall in April, May and June to supply all the moisture required by all crops until the end of June. The first irrigating done was on July 2, when water was applied to lawns and pastures. From then until the second of September, the weather was extremely dry, necessitating the use of water almost constantly during that period; in fact much more water


Seasonal Variation of Water used on
196 Acres in Periods of 10 Days for the
Years 1922-1923-1924-1925-1926-1927-1928-1929
Depth of Water (Acre Feet)
Total Water Applied
Acre Feet
1922
1923
1924
1925
1926
1927
1928
1929
May 1st
May 10th
May 20th
May 30th
June 9th
June 19th
June 29th
July 9th
July 19th
July 29th
Aug. 8th
Aug. 18th
Aug. 28th
Sept. 7th
Sept. 17th
Sept. 27th
Oct. 7th
Oct. 17th

should have been used but a serious shortage developed because of the small flow in the St. Mary's river which supplies the irrigation system. This shortage was the most acute experienced in a number of years, and caused considerable injury to crops.

But little water was used during the month of September, but in October fall irrigation required thirty acre-feet. This was used on lands that are to be planted to beets or other small seed crops next year and to alfalfa. The water was turned out of the canals on October 22.

ACRE-FEET OF WATER USED ON 196 ACRES OF LAND IN PERIODS OF TEN DAYS—1922 TO 1929 INCLUSIVE

Ten-day period	1922	1923	1924	1925	1926	1927	1928	1929	Average for eight years
May 1 to May 9	.....	6·02	.....	.....	4·53	.....	.....	.....	1·32
May 10 to May 19	.....	3·97	3·64	1·60	12·04	.....	.....	.....	2·66
May 20 to May 29	.....	7·82	17·50	1·50	29·54	.....	23·34	.....	9·97
May 30 to June 8	7·28	8·58	13·54	8·03	25·66	.....	13·21	.....	9·54
June 9 to June 18	17·68	6·29	3·72	20·51	24·93	.....	.....	.....	9·14
June 19 to June 28	21·41	2·08	2·60	20·64	2·30	.....	.....	.....	6·13
June 29 to July 8	6·91	5·21	27·41	14·91	1·15	.....	.....	14·44	8·74
July 9 to July 18	4·99	21·52	33·04	15·10	9·89	0·61	.....	24·88	13·75
July 19 to July 28	46·81	15·08	22·41	20·85	20·41	4·73	.....	40·08	21·29
July 29 to Aug. 7	21·94	30·23	11·65	18·32	15·42	17·60	.....	21·51	17·08
Aug. 8 to Aug. 17	19·99	23·46	1·36	25·59	7·81	10·70	18·04	25·70	16·58
Aug. 18 to Aug. 27	11·96	14·40	0·39	13·10	0·92	.....	13·15	28·18	10·14
Aug. 28 to Sept. 6	1·30	1·91	0·26	0·52	8·05	.....	.....	19·88	4·08
Sept. 7 to Sept. 16	.....	1·81	.....	7·28	4·10	.....	.....	.....	1·65
Sept. 17 to Sept. 26	.....	.....	1·22	.....	.....	.....	.....	6·75	1·00
Sept. 27 to Oct. 6	.....	2·00	10·40	.....	.....	.....	.....	10·88	2·91
Oct. 7 to Oct. 16	19·25	50·34	14·07	4·68	.....	.....	.....	4·46	11·60
Oct. 17 to Oct. 27	.....	13·03	15·36	.....	.....	.....	.....	15·04	5·43
Total	179·52	213·75	178·57	172·53	166·75	33·64	67·74	211·80	153·01

HORTICULTURE

The spring and summer of 1929 were on the whole quite favourable. The showers in the spring ensured good germination of small seeds. The dry weather from July on was undesirable for growth on the dry land, although this naturally did not affect the irrigated land.

On the other hand the winter of 1928-29 was not favourable for trees and shrubs as there was more winter-killing observed in the spring than has been the case for several seasons past. This was particularly noticeable on the flowering shrubs and the apple trees, with the exception of the hardy crabs.

The last frost in the spring occurred on May 19, and the first frost in the fall September 6, and the first killing frost September 28. There was very little trouble with insect pests during the season.

PREPARATION OF THE LAND FOR VEGETABLE GROWING

As has been mentioned in previous reports, experience in this district has shown that if most satisfactory results are to be obtained from dry land vegetable gardens it is just as necessary to plant the vegetables on summer-fallow as it is to sow grain on summer-fallow. For this reason it is well to have the farm garden large enough so that half of it may remain fallow and be kept perfectly black all summer and only crop the other half. If this is to be done it is obvious that windbreaks will have to be provided to ensure against soil drifting. Manure should only be applied when the land is being ploughed for the summer-fallow, which means that the manure will be applied one year

previous to the time of planting. In this way it has an opportunity of becoming rotted and well incorporated into the soil. Under these conditions the presence of manure adds to the humus in the soil and also aids in retaining moisture. On the other hand if freshly applied manure is ploughed under just previous to planting it has the opposite effect, drying the soil out and actually reducing the resultant crop.

On irrigated land, where the summer-fallow is not introduced, well rotted manure should be applied in the fall and ploughed under. If the autumn is dry an irrigation before ploughing is desirable. Immediately after ploughing the land should be harrowed down to prevent any lumps remaining on the surface. The importance of fall ploughing the irrigated land cannot be over-emphasized, and to obtain satisfactory results the soil must be in a moist condition when so ploughed.

DRY LAND VEGETABLE GARDEN

Ample moisture in the spring ensured good germination of all seeds planted and the different varieties of vegetables made a good start, but the dry weather of July and August prevented them from developing as well as in some other seasons. The difference in the cultural methods recommended for the dry land garden as compared to the irrigated garden is that the rows of all vegetables should be placed wider apart and the distance between the vegetables in the rows should be greater. The idea of this is to allow the roots of each individual plant to have more space in which to forage for moisture. The orthodox mode of planting onions and radishes for example 12 inches to 14 inches apart should be departed from and the spacing should be made much wider. This also has the additional advantage of allowing a horse cultivation to be resorted to.

The detailed results of our experiments on the dry land will not be reported. The results obtained on the irrigated land will be applicable in the main to dry land conditions except for the fact just mentioned that wherever possible the spacing between the plants should be made greater, and the yields will be less —just how much less will be determined by the amount of rainfall during the particular season in question.

IRRIGATED LAND VEGETABLE GARDEN

Variety testing was carried out with the usual number of varieties of vegetables. Mention will be made from time to time of any variety of outstanding merit as compared with the standard sorts ordinarily grown. A pamphlet giving a complete list of the varieties of vegetables recommended for the district, together with information as to date of planting, date when ready for use, etc., can be obtained on application to this Station.

CULTURAL EXPERIMENTS WITH VEGETABLES

A number of cultural tests have been carried on during the past few years in the irrigated garden with some of the common vegetables. These include different dates of planting, different rates of seeding, i.e., different distances apart in the row, and different methods of management.

BEANS.—This project was undertaken with the object of finding out the relative earliness, yield, and quality as a green vegetable, also the best distance to plant for seed purposes. A row 30 feet long, with rows 2½ feet apart, was sown, with the seed placed 2 inches, 4 inches, and 6 inches apart in the rows. The beans from half the row were picked green and the other half of the row was left to ripen. The following table gives the results obtained during the 1929 season and also the average yields for the past three years:—

BEANS—RESULTS FROM DIFFERENT RATES OF SEEDING

Variety	Distance	Date sown	Ready for use	Weight per 15 feet green vegetable 1929	Weight 15 feet seed, 1929	Average weight 3 years per 15 feet green vegetable	Average weight 3 years per 15 feet seed
	inch			lb. oz.	lb. oz.	lb. oz.	lb. oz.
Round pod kidney wax	2	May 16	July 22	6 0	1 4	7 0	1 3
" "	4	May 16	July 24	5 8	1 0	6 0	1 0
" "	6	May 16	July 24	3 4	0 12	3 4	0 8
Stringless green pod	2	May 16	July 28	6 8	1 0	7 10	1 4
" "	4	May 16	Aug. 3	5 4	0 12	6 12	0 15
" "	6	May 16	Aug. 3	5 0	0 8	6 13	0 11

Results obtained over a period of three years show that the closer planting in the rows gave a heavier yield and an earlier maturity. No difference in quality was observable between the different plantings.

CABBAGE—DIFFERENT DATES OF SEEDING.—The usual method of growing cabbage in the district is to grow the plants in a hot-bed and transplant into the open. For summer or early fall use this practice must be resorted to, but much labour could be saved if the practice of transplanting could be eliminated. In order to determine the best date for sowing cabbage seed in the open to produce a crop for winter use, seed was sown on six different dates, beginning as early as possible in the spring and continuing until the middle of June. The seed was sown in rows 2½ feet apart in the garden at intervals of 10 inches apart in the row. As soon as the young plants were large enough they were thinned out so that single plants were left 10 inches apart in the row. Twenty-five heads from each variety were weighed and their conditions noted.

The following table gives the results obtained during the 1929 season, and also the average yield and condition for the past five years:—

CABBAGE—RESULTS FROM DIFFERENT DATES OF SEEDING

Variety	Date sown	Condition of heads when harvested, 1929	Weight from 25 heads, 1929	Condition of heads, average of 5 years	Weight, from 25 heads, average of 5 years
			lb.		lb.
Copenhagen Market	April 17	Split	188	Split	135
"	April 26	Some split	135	Some split	96
"	May 5	Good shape	164	Good shape	95
"	May 15	Fair	188	Fair	85
"	May 28	Poor	87	Poor	37
"	June 12	Very poor			
Danish Ballhead	April 17	Very good	143	Very good	80
"	April 26	Good	114	Good	73
"	May 5	Poor	110	Fair	63
"	May 15	Very poor		Very poor	
"	May 28	Very poor		Very poor	
"	June 12	Very poor			

Results over a period of five years seem to indicate that the best time to sow seed of Copenhagen Market in the garden for winter use would be about the first week in May, for if this variety is seeded earlier the heads are inclined to burst.

Danish Ballhead being a later variety requiring a longer season should be sown as early as possible, and not later than the beginning of May.

In regard to varieties of eabbage, a variety that has been reeently introduced, and has been tested for the past few years at the Station, is Golden Aere. This appears to be outstanding in partieular referenee to earliness and yield, as it produees uniform solid heads a week to ten days earlier than the Copenhagen Market.

CARROTS—DIFFERENT DATES OF SEEDING.—The objeet of the test was to determine the relative earliness, yield, and quality as a midsummer vegetable and also as a matured erop for winter use. One row 30 feet long was sown at intervals of ten days, beginning as early as possible and eontinuing until the middle of June. One-half of eaeh row was harvested in midsummer, and the other half of the row was left until matured. The variety used throughout the experiment was Chantenay. The results over a period of five years show that early sowing gives the best results for an early table vegetable, but that for the produetion of earrots for winter use about the end of April is the best time to sow, as carrots sown mueh before this date have a tendeney to split before they are lifted in the fall.

CORN—SUCKERING EXPERIMENT.—The objeet in view in earrying out this experiment was to determine its effeet on earliness and yield, and also the effect, if any, on the ear development. The two varieties used were Early Maleolm and Golden Bantam. The seed was planted in hills three feet apart as soon as danger from frost was passed. On one plot all suekers were removed as soon as they appeared, while on the other plot the suekers were allowed to remain. The following are the results from the 1929 season and also the average yield for the past five years under the same eonditions:—

RESULTS OF SUCKERING EXPERIMENT

Variety	Date planted	Ready for use	Number of cobs	Number of cobs, average 5 years
Early Malcolm—				
Suekers removed	May 18	Aug. 24	110	60
Suekers left on	May 18	Aug. 29	118	85
Golden Bantam—				
Suekers removed	May 18	Aug. 29	102	61
Suekers left on	May 18	Sept. 2	128	89

Results over a period of five years show that removing the suekers slightly hastens maturity but lessens the yield. It is doubtful, however, whether the slight gain in earliness would warrant the praetiee when growing eorn on a eommercial seale.

The most popular variety of sweet eorn is Golden Bantam, but in some seasons it is too late to be satisfaetory, in that it is barely ready for use when frost oeeurs in the fall. An extremely early variety, and one whieh resembles Golden Bantam in eolour, is the Banting. This variety was developed at the Central Experimental Farm. It ranks amongst the very early sorts and possesses good quality for an early variety, but, of eourse, is not quite in the same class as Golden Bantam, for flavour and quality. However, in loealities where Golden Bantam eannot be grown sueeessfully the Banting should be tried; in fact it should be given a plaee in every garden, as its earliness in providing corn for the table is particularly aeeeptable even where Golden Bantam ean be grown, as it provides eorn ten days to two weeks earlier than the Golden Bantam.

CELERY.—Results over a period of four years show that blanching with boards, as compared with the ordinary method of blanching with soil, has given better results, and owing to less labour being involved in the former method it is a very desirable practice from a commercial standpoint when early celery is required.

PEAS—DIFFERENT DISTANCES OF PLANTING.—This test was undertaken with the object in view of determining the relative earliness, yield, and quality of the pod pea for summer use, and also to obtain data concerning seed production.

A row 30 feet long with rows 2½ feet apart was planted with the seed placed 2, 4, and 6 inches apart in the row. Fifteen feet of each row were picked green and fifteen feet were left to ripen. The following are the results obtained during the 1929 season and also the average yield for the past three years:—

PEAS—RESULTS FROM DIFFERENT DISTANCES OF PLANTING

Variety	Distance	Date sown	Ready for use	Weight per 15 feet green vegetable	Weight per 15 feet seed	Average weight 3 years per 15 feet green vegetable	Average weight 3 years per 15 feet seed
	inch			lb. oz.	lb. oz.	lb. oz.	lb. oz.
Thomas Laxton	1	April 17	July 8	7 4	1 0	5 9	1 1
	2	April 17	July 8	6 0	0 12	4 14	0 15
	3	April 17	July 8	5 4	0 12	3 11	0 12
English Wonder	1	April 17	July 8	5 8	0 12	6 0	1 9
	2	April 17	July 10	5 0	0 10	5 5	1 7
	3	April 17	July 10	3 0	0 8	3 14	0 14
Stratagem	1	April 17	July 22	6 8	1 8	6 8	1 7
	2	April 17	July 22	6 0	1 6	5 14	1 1
	3	April 17	July 22	4 8	0 12	4 3	0 12

A study of the table indicates that the results are in favour of the closer planting from every standpoint.

PARSNIP—DIFFERENT DATES OF SEEDING.—The object in view was to determine the best time to sow seed in order to secure the highest yield. One row 30 feet long with rows 2½ feet apart was sown at intervals of ten days, beginning as early as possible and continuing until the middle of June. The following table gives the results obtained during the 1929 season, also the average yield for the past five years:—

PARSNIPS—RESULTS FROM DIFFERENT DATES OF SEEDING

Variety	Date sown	Quality	Weight	Average weight for 5 years
			lb.	lb.
Hollow Crown	April 17	Very good	77	60
	April 26	Very good	75	58
	May 5	Good	61	55
	May 15	Fair	48	46
	May 28	Poor	23	40
	June 12	Poor	.....	.....

Results over a period of five years show that the earlier parsnip seed can be sown the better the yield.

BEETS—DIFFERENT DATES OF SEEDING.—The objective in view was to determine the relative earliness, yield and quality as a summer vegetable, and also as a matured crop from different dates of seeding. One row 30 feet long with rows 2½ feet apart was sown at intervals of ten days, beginning as early as possible in the spring and continuing until the middle of June. Fifteen feet from each row were used when the beets were ready for table use, and to determine the yield and quality these were tied up in bunches, five in a bunch, and the unmarketable bunches tabulated. The remaining 15 feet were left growing until the end of the season. The following table gives the results obtained during the 1929 season and also the average yields for the past five years:—

BEETS—RESULTS FROM DIFFERENT DATES OF SEEDING

Variety	Date sown	Number of marketable bunches per 15 feet 1929	Number of unmarketable bunches per 15 feet 1929	Weight matured per 15 feet 1929	Average number marketable bunches per 15 feet for 5 years	Average number unmarketable bunches per 15 feet for 5 years	Average weight matured per 15 feet for 5 years
				lb.			lb.
Detroit Dark Red—	April 17	12	1	85	8	2	55
	April 26	21	2	69	10	3	61
	May 5	17	4	68	8	5	47
	May 15	10	4	62	7	4	52
	May 28	7	5	54	7	3	40
	June 12	Nil	Too small	21	3	2	23

Results over a period of five years show that early planting gives the best results for summer use, and also the heaviest yield, but it was found that seed sown before the first week in May produced beets too large and coarse to be desirable for winter use.

POTATOES—DIFFERENT DATES OF PLANTING.—The object in carrying out this test was to get some information as to the best date to plant potatoes. Gold Coin and Irish Cobbler were the two varieties used. The first planting was made early and the later ones were made at intervals of ten days. The following table gives the results obtained:—

POTATOES—RESULTS FROM DIFFERENT DATES OF PLANTING

Variety	Date planted	Date harvested	Yield per acre 1929		Average yield per acre for 4 years	
			tons	lb.	tons	lb.
Gold Coin	April 26	Oct. 12	10	460	10	270
	May 5	Oct. 12	11	880	10	1,540
	May 15	Oct. 12	10	20	9	1,830
	May 28	Oct. 12	6	1,860	5	983
	June 12	Oct. 12	5	120	3	735
Irish Cobbler	April 26	Oct. 12	13	1,500	10	1,450
	May 5	Oct. 12	12	1,300	10	265
	May 15	Oct. 12	11	1,980	11	1,005
	May 28	Oct. 12	9	40	11	160
	June 12	Oct. 12	3	1,200	3	350

Results over a period of four years show that to get the best results from the Gold Coin the sets should be planted as early as possible, and not later than the middle of May. Irish Cobbler being an earlier variety can be grown as a profitable crop when planted as late as the end of May.

TOMATOES—METHODS OF TRAINING.—The object in view was to determine the relative earliness and yield of ripe tomatoes when plants were pruned to one, two or three trusses. Twenty-five plants of Bonny Best and twenty-five plants of Alacrity were used in each case. They were started under glass on March 19, and planted out in the open on May 31 one foot apart in rows with the rows two feet apart and pruned to a single stem. The following table gives the results obtained during the 1929 season, also the average yields for the past three and four years:—

TOMATOES—RESULTS FROM DIFFERENT METHODS OF TRAINING

Variety	Date ready for for use	Ripe fruit		Green fruit		Average ripe fruit, four years		Average green fruit, 4 years	
		lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Bonny Best—									
Stopped at—									
1st truss	Aug. 24	8	4	24	0	11	6	18	12
2nd truss	Aug. 24	26	8	35	0	25	0	33	8
3rd truss	Aug. 24	27	4	46	0	30	4	46	0
Alacrity—*									
Stopped at—									
1st truss	Aug. 24	12	4	17	0	11	0	20	10
2nd truss	Aug. 24	17	8	29	0	17	8	25	0
3rd truss	Aug. 24	19	0	41	0	18	4	33	0

*Grown only 3 years.

SMALL FRUITS—IRRIGATED

CURRANTS.—The red, white and black currants fruited well. Currants are a type of fruit that have proven hardy in the district. The red currant rarely fails to produce a satisfactory crop. The white currant is in the same class, but as the fruit is not so much in demand there is less reason to grow it. The yields from the black currants are less reliable, as spring frosts appear to injure the bloom in some seasons. In growing currants some care should be given to the pruning, and they should not be allowed to grow wild. The dead wood should be trimmed out annually, and at least some of the suckers should be removed. In pruning it should be remembered that, with the red and white currants, the fruit is borne on two year old wood, while with the black currants the fruit is borne on the new wood.

GOOSEBERRIES.—These are less hardy than are the currants. The only common variety that is perfectly hardy is the Houghton.

RASPBERRIES.—The raspberries fruited well during the season of 1929. During the twenty odd years that this Station has been established raspberries have never failed to fruit, but with the dry conditions that prevail in the district during the winter time it has been found necessary to cover them entirely with moist soil, otherwise the canes dry out and in most seasons kill to the ground. By resorting to this winter treatment it is not necessary to pay much attention to hardiness. Any of the common varieties such as the Herbert and Cuthbert are satisfactory.

TREE FRUITS

The Saunders cross bred apple trees came through the winter in good condition, and, as usual, a heavy crop of crab apples was harvested. The standard varieties of apples did not fare so well as more winter-killing occurred. Up to the present time no variety of apple larger than a crab has been found that is hardy. The fact that a few varieties such as Hibernal, Patten's Greening and other varieties that could be named, are partially hardy at Lethbridge is sufficiently encouraging to warrant continued testing of new sorts in an endeavour to find a variety that will withstand this rigorous climate.

Although considerable winter-killing occurred in the standard apple orchard some fruit of good quality was obtained from varieties such as Hibernal, Patten's Greening, Yellow Transparent, and a number of new sorts produced at the Central Experimental Farm at Ottawa.

PLUMS.—Several named varieties have been under test for the past number of years such as Hanska, Sapa, Opata, Aitken and Cheney, but all these are only semi-hardy in this district. The native plum of Manitoba is perfectly hardy but the fruit crop is uncertain. In 1929 a fair crop was obtained, but in many seasons the flower buds are destroyed during the winter.

TREES AND SHRUBS

The trees, particularly the shrubs, did not come through the winter as well as usual. There was a large amount of winter-killing in the shrubbery, as even a small percentage of killing back was observed with the honeysuckles. Although all varieties of lilacs bloomed freely they appeared weak and their leaves undersized during the early summer, but like many of the other trees and shrubs recovered as the season advanced.

Of the various trees grown it is noteworthy that the evergreens are rarely affected by winter conditions. Farmers would be well advised to pay more attention to the planting of conifers than has been the practice in the past, especially with some shelter from trees such as poplars and willows the ordinary spruce and pine will thrive after once becoming established. One of the greatest values of the evergreen is the colour it affords in the winter time when all other tree growth is gray and bare.

FLOWERS

Both the perennials and annuals did excellently, making a beautiful display of colour.

A little attention given to having some tulips to bloom in the spring with some perennials to follow in the early summer and annuals for the late summer and early fall, will produce a continuous supply of colour that goes far in beautifying the home surroundings.

POULTRY

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

The winter of 1928-29 was very severe, the temperature on one occasion going down as low as 45° F. below zero on January 25, in spite of this, two birds made records of 308 and 304 eggs respectively; two laid between 276 and 300 eggs; eighteen between 251 and 275; thirty-eight between 226 and 250, and seventy-one between 200 and 225 eggs. Culling for egg size was commenced the first of August and greatly reduced the number of possible two-hundred egg hens. No pullet was allowed to finish her year unless her eggs averaged 23 ounces per dozen after the first month's lay, and unless her body weight was five pounds or over, and she was of good type.

FEEDING

Scratch grain, consisting of a mixture of 300 pounds of wheat, 100 pounds of oats, 100 pounds cracked corn (150 pounds in winter), was fed twice daily. A small portion was given in the morning to get the birds to scratching and exercising, and the balance about one hour before the birds went to roost. A

dry mash made up as follows: 100 pounds low grade flour, 100 pounds shorts, 100 pounds bran, 100 pounds oat chop, 100 pounds yellow corn meal (150 pounds in winter), 75 pounds beef scrap, 30 pounds fine bone meal, 10 pounds charcoal, and 7 pounds fine salt, was kept before the birds at all times in open mash hoppers. A moist, crumbly mash consisting of 150 pounds yellow corn meal, 150 pounds oat chop, 100 pounds shorts, 100 pounds bran, and 10 pounds cod liver oil, was fed to all the birds daily at noon, as much as they would eat in ten minutes. Green feed consisted of cabbage, mangels, turnips, beets, sugar beets, and alfalfa leaves. This was augmented in the spring by the growth of alfalfa in the runs. After this supply was exhausted, green alfalfa was cut daily and fed to the birds.

Alternate runs were used for all mature stock, and triple runs for all growing stock, thus reducing the danger of parasite infestation from contaminated soil.

BARLEY VS. CORN FOR LAYING PULLETS

In the previous year's report of the Station the results were given of four years' comparison of corn and barley as ingredients in the laying mash and scratch feed given to laying pullets. This experiment was continued this year with three pens of twenty-five Barred Rock pullets each. One of the pens received barley with one per cent cod liver oil added, one, barley with no cod liver oil, and one, corn without cod liver oil. The feeding and management of these pens were the same as were accorded the balance of the Station flock, as previously described, except for the substitution of barley for corn and the elimination of cod liver oil from the feed of two pens.

There was little difference in the egg production of the pens receiving corn and those receiving barley and cod liver oil, but the pens fed barley wtih no cod liver oil have given a lower production each year than either of the other pens. The lower egg production from barley without cod liver oil has been offset, however, by the lower cost of the barley as is shown by the feed cost per dozen eggs produced, which is 0·2 cent less for the barley fed pens than for those receiving corn or barley and cod liver oil.

The important difference in the results obtained from the various feeds was in the mortality experienced. The data in the table show that the mortality was decidedly lower in the pens receiving corn than in either of the barley-fed lots. The addition of cod liver oil to the barley ration apparently decreased the mortality.

From the accumulated data and from observations made while the experiment was in progress, it would seem that the barley used was inferior to corn as a poultry feed, especially if supplementary feeds high in vitamine "A" were not fed. This was especially evident in those years when no special care was taken to select well cured alfalfa and other supplementary feeds known to be high in this vitamine. In those years many of the birds fed barley without cod liver oil showed exaggerated symptoms of vitamine "A" deficiency and a number of deaths were undoubtedly due to that cause. When well cured alfalfa or cod liver oil was fed no head swellings nor throat lesions were observed.

The comparatively high death rate in all of the barley-fed pens, even when cod liver oil was fed, indicate that some factor, in addition to vitamine "A" deficiency, contributed to the higher mortality experienced when barley was fed.

AVERAGE EGG PRODUCTION PER BIRD IN TEN MONTHS, FEED COST PER DOZEN EGGS PRODUCED AND PER CENT MORTALITY IN PENS FED CORN, BARLEY OR BARLEY AND COD LIVER OIL

Year ending Sept.	Egg production in 10 months			Feed cost per dozen eggs produced			Per cent mortality		
	Corn	Barley	Barley and cod liver oil	Corn	Barley	Barley and cod liver oil	Corn	Barley	Barley and cod liver oil
				cts.	cts.	cts.	%	%	%
1925.....	.201††	174††	.....	.....	.....	.....	18	46	.....
1926.....	149	147	.....	.....	.....	.....	8	8	.....
1927.....	153	147	159	.....	.....	.....	16	35	33
1928.....	156	150	158	12·3	12·2	12·2	4	24	16
1929.....	154	148	150	15·1	14·9	15·3	4	8	4
Average..	163	153	.....	13·7	13·5	13·7	10	24	.....
3-year average.	155	148	156	.....	.....	.....	8	22	18

*Accidental deaths not included.
††12 months record.

POULTRY HOUSE TEMPERATURE AND VENTILATION

Considerable trouble had been experienced with Single Combed White Leghorn pullets entered in the Alberta Egg Laying Contest having their combs frozen during periods of extremely cold weather. To overcome this condition, a new contest house was built in 1927. This building was carefully constructed to provide comfortable quarters for the pullets. The house is of shed roof type with double tar paper on both sides of the walls and the walls and ceiling packed with six inches of planer shavings. It is twenty feet deep and eighty-four feet long and is divided with tight, single board partitions, into rooms fourteen feet wide. Each room accommodates sixty heavy breed birds or seventy-two of the light breeds. The front of the house is one-third lumber and the balance glass and cotton. A door opens outside from each room. Ventilation is through adjustable cotton and glass windows and on warm days the door is left open. No artificial heat is provided.

Maximum and minimum temperatures were taken in this house at intervals during the winter of 1927 and 1928. The thermometers were placed in the east end room on the inside wall just in front of the roosts on a level with the birds when at roost. The lowest temperature recorded in the building was 21° F. above zero, with an outside temperature of 34° F. below zero. The same night that this temperature was recorded a comparable minimum thermometer showed 3° below zero in a gable roofed house with straw loft and unpacked walls. This house is 16 by 32 feet in size and contained one hundred Barred Rock pullets.

At no time during the winter did the birds in the contest appear to be uncomfortable from the cold, no combs were frozen and there was not the decided drop in production that was experienced in colder houses when extremely low temperatures prevailed. Observations here have shown that birds do not appear to be uncomfortable if the temperature of the house does not go below 15° F. but with a temperature of 10° F. or lower many of them huddle together in the corners and appear decidedly uncomfortable. From the standpoint of temperatures this house seems to be warm enough for the birds' comfort. Whether or not there is sufficient ventilation is more difficult to determine. No more colds were experienced in the flock than in the previous years when the birds were kept in more open houses. The straw litter got damp more quickly than in the colder houses, but the difficulty from this cause was not extreme.

The ventilation of the building was further studied during the winter of 1928-29 by making determinations of the humidity and carbon dioxide content of the air in the building. Similar data were obtained for comparisons in the gable roofed house to which reference has already been made. Humidity was determined with a self recording hygro-thermograph of the hair type which was checked with a sling psychometer. The carbon dioxide content of the air was measured with a Wolpert's Carbacidometer using sodium carbonate as a reagent and phenolphtaline as an indicator.

HUMIDITY.—The humidity usually went up to the saturation point or 100 per cent relative humidity in both houses on cold nights when the cotton screens were closed, and on stormy days. On dry days in winter when the screens were open the relative humidity often went down below 60 per cent in the contest house and from 5 per cent to 10 per cent lower in the gable roof house. Some frost collected on the walls of the contest house and the straw litter showed some, but not excessive, dampness. There was no frost or dampness in the gable roofed house.

CARBON DIOXIDE.—On six separate dates during the winter tests were made of the carbon dioxide content of the air in two rooms of the contest building and one room of the gable roofed house. Each test was made in the morning before the screens were opened so that the carbon dioxide content of the air was undoubtedly at its maximum when the tests were made.

The number of parts of carbon dioxide to one thousand parts of air, and the temperature of the room when the determinations were made are shown in the following table.

PARTS OF CARBON DIOXIDE IN 1000 PARTS OF AIR AND ROOM TEMPERATURE AT TIME DETERMINATIONS WERE MADE IN TWO ROOMS OF ALBERTA EGG LAYING CONTEST HOUSE AND IN A GABLE ROOFED STRAW-LOFT HOUSE

Date 1929	Contest House End Room		Contest House Centre Room		Gable House	
	Room temperature	CO_2 content	Room temperature	CO_2 content	Room temperature	CO_2 content
	°F.		°F.		°F.	
Jan. 18	32	0·57	32	0·57	26	0·45
Jan. 19	28	0·48	28	0·48	22	0·39
Jan. 22	22	0·48	22	0·48	15	0·39
Feb. 1	30	0·63	30	0·63	19	0·49
Mar. 6	38	0·63	38	0·60	41	0·48

Air with less than 0·70 parts of carbon dioxide to one thousand parts of air is usually considered good if carbon dioxide content is taken as the gauge. If this is a true index each test showed the air to be good. The lower carbon dioxide content in the air of the gable roofed, straw-loft house indicates a greater air circulation than was experienced in the shed roofed, insulated, contest house.

TENTH ALBERTA EGG LAYING CONTEST

Twenty-nine pens completed the fifty-one weeks test of the tenth Alberta Egg Laying Contest. Of this number there were ten Single Comb White Leghorn pens, eight Barred Plymouth Rocks, three Single Comb Rhode Island Reds, three White Wyandottes, two Buff Orpingtons, one Rose Comb White Leghorns and one Rose Comb Rhode Island Reds.

FINAL STANDING OF THE FIVE LEADING PENS AND BIRDS

Leading Pens†

Breed	Owner	Eggs	Points
1. S.C. Rhode Island Red	Fred Garrick, Coalhurst, Alta	2,043	2,316·8
2. Barred Plymouth Rock	E. Brewitt, Michichi, Alta	2,027	2,259·5
3. S.C. Rhode Island Red	Mrs. J. W. Cooper, Rainier, Alta	1,745	2,055·5
4. S.C. White Leghorn	Calgary Poultry Farm, Calgary, Alta	2,023	1,999·4
5. S.C. White Leghorn	W. J. O'Neaill Innisfail, Alta	1,722	1,954·8

Leading Birds†

1. S.C. Rode Island Red	Fred Garrick, Coalhurst, Alta	246	292·9
2. S.C. White Leghorn	Calgary Poultry Farm, Calgary, Alta	281	287·5
3. Barred Plymouth Rock	E. Brewitt, Michichi, Alta	231	286·0
4. S.C. Rhode Island Red	Fred Garrick, Coalhurst, Alta	233	282·7
5. Barred Plymouth Rock	R.L. Rash, Purple Springs, Alta	236	278·6

†Arranged in the order of total points; an egg averaging 24 ounces per dozen was credited as one point. One-tenth point was added for each ounce per dozen over 24 ounces and one-tenth point was deducted for each ounce under twenty-four ounces. Eggs weighing over 27 ounces were considered as 27-ounce eggs, while eggs under 20 ounces were not counted.

POULTRY REGISTRATION

Birds of any recognized breed entered in the contest are entitled to registration in the Canadian Live Stock Records if they have no standard disqualifications, and lay 200 eggs during the contest year, providing the eggs average 24 ounces per dozen in weight after the first month's lay.

HENS REGISTERED IN 1929

Breeder	Breed	Number of birds registered	Average eggs	Average points
E. Brewitt, Michichi, Alta	B.P.R.	7	222	250
Fred Garrick, Coalhurst, Alta	S.C.R.I.R.	6	229	257
Calgary Poultry Farm, Calgary, Alta	S.C.W.L.	3	235	249
Hillcrest Poultry Farm, Salmon Arm, B.C	S.C.W.L.	3	229	245
C. W. Drayton, Picardville, Alta	B.P.R.	3	217	250
Frank Edwards, Edmonton, Alta	B.P.R.	3	208	245
Mrs. J. W. Cooper, Rainier, Alta	S.C.R.I.R.	3	207	257
G. E. Harp, Shouldice, Alta	B.P.R.	2	230	259
Clover Lea Stock Farm, Edmonton, Alta	S.C.W.L.	2	222	240
Glen Brown, Big Valley, Alta	S.C.W.L.	2	218	253
W. J. O'Neail, Innisfail, Alta	S.C.W.L.	1	246	252
J. W. Sidford, Busby, Alta	B.P.R.	1	232	240
Experimental Station, Lacombe, Alta	W.W.	1	231	250
Mrs. P. J. Hutchings, Edmonton, Alta	B.P.R.	1	229	244
Mrs. W. J. Bell, Baintree, Alta	S.C.W.L.	1	229	242
R. L. Rash, Purple Springs, Alta	B.P.R.	1	228	240
Round T Ranch, High River, Alta	S.C.W.L.	1	226	243
Frank Gould, Big Valley, Alta	B.P.R.	1	212	240
S. Coldwell, Stettler, Alta	S.C.W.L.	1	207	253
Experimental Station, Morden, Man	S.C.R.I.R.	1	207	243
J. H. Mufford and Son, Milner, B.C	S.C.W.L.	1	206	250
Barry F. Galbraith, Sangudo, Alta	S.C.W.L.	1	202	259
E. E. Stafford, Sheerness, Alta	B.O.	1	201	256

BEES

Each year sees an increase in the interest taken by farmers generally in beekeeping in Southern Alberta, especially in the irrigation areas. Many farmers in the last year or so have made a start with two or three colonies for the production of honey for their own use, while the expansion of commercial beekeeping in the district has been extremely rapid.

WINTER OF 1928-29

The fall of 1928 was mainly warm and bright. All of the colonies on the station were fed and packed for winter in good condition by October 20. The winter, however, was a long severe one. In January the lowest temperature since 1911 was recorded, when 45·2 degrees below zero was registered. During this month there were twelve consecutive days when the temperature did not go above zero, which is an unusual occurrence for the district.

There was no bee flight from November 24 until February 7. The continued confinement caused some dysentery, but not to an extent that could be considered serious. Of the ninety-four colonies packed for winter, eighty-one were alive on April 15. Some weak and queenless colonies were later united during a shortage of nectar in early June.

THE SEASON

Weather conditions for the 1929 honey season were not the best. April was cold and wet, there being more snow and rain than usual. May was also cold and backward, with rain, snow, and frosts, which retarded the nectar supply to a later date than usual. In order to counteract the unfavourable weather conditions and to ensure a normal increase in the bee population each colony was given one partly filled comb of honey or five pounds of sugar syrup. The colonies were allowed to remain with the brood chambers packed in the wintering cases till the last week in May. Pollen was available from willows as early as March 25, and intermittently from then on from different sources till the main honey flow began the first week of July. The records from the colonies on scales showed that not until the middle of June was there sufficient nectar available for even mere maintenance. A fair amount of honey was produced in the month of July. During August the flow was slightly less until the 25th, when it ceased entirely.

OUTSIDE WINTERING

All bees kept in the Lethbridge district are now wintered outside, as the old practice, never in general use, of storing the bees in cellars for the winter is now definitely discontinued. Experience has shown that outside wintering is practical provided the colonies are started into the winter with ample stores and some form of protection is provided the hive. The 1928 report of this station describes the different methods of packing for wintering that have been tested, along with the results obtained. In providing the bees with winter stores it has been found desirable to feed a certain quantity of sugar syrup for the reason that, in some winters, all the honey is apt to granulate, and under such circumstances the sugar syrup which does not granulate would provide liquid stores. In a mild winter where the bees have regular flights it is not so important, but where the winter is severe having some liquid stores appears to be of decided advantage.

PACKAGE BEES FOR ESTABLISHING COLONIES

As has been mentioned in previous reports from this Station, the bringing in of package bees from the Southern States for the starting of colonies is very practical and has the advantage of lessening the danger of introducing disease to almost the vanishing point. The best time to receive the package bees would appear to be from about May 12 to 27. It has been found that when received as late as June 15, although they developed into strong colonies well supplied with honey stores for the winter, they were not able to produce any surplus honey. Of importance to the beginner with bees, who will not have on hand drawn combs on which to start the package bees, is the fact that experiments have shown that the bees may be started on foundation wax and still produce a fair amount of surplus honey, provided they are received in good time in May, and are fed liberally on sugar syrup till the honey flow starts. In the tests carried on to date the two-pound packages have been found to be just as satisfactory as the three-pound packages.

CONTROL OF SWARMING

Five years' results of three tests are available dealing with the question of control of swarming. They are:—

A. Swarm control by dequeening and requeening.
B. Swarm control by separation of the queen and brood.
C. Periodical destruction of queen cells.

In test A the procedure followed was to remove the queen and destroy all queen cells formed as soon as the latter had developed sufficiently to contain larvæ. Nine days later all queen cells were again destroyed and a young laying queen was given to the colony. This manipulation appears to control swarming fairly well, but a serious objection to it is that at least nine days' eggs are lost. The reason that this is a point worthy of consideration is that the eggs would have time to develop into field workers before the honey flow is over in August.

In test B all combs containing brood were removed from the brood chamber as soon as the queen cells were found that contained larvæ, and replaced with empty drawn combs on which the queen was placed, along with what bees could be shaken from one of the combs of brood. A queen excluder was placed over the brood chamber, the extracting supers were put on covered with another queen excluder. A super, containing the combs of brood, just taken from the brood chamber, was then placed on top. The hive cover was then put on, care being taken to see that it fitted snugly so as to prevent the escape of any virgin queen that might hatch. This method of manipulation was found the most satisfactory of the three. It not only controlled swarming about as well as did test A, but, as the laying of the queen was not interfered with, stronger colonies for the latter part of the summer flow were obtained. The average annual production of honey per colony for five years was 94 pounds with this treatment, as compared to 79 pounds for the treatment as described under A, with 64 pounds under C.

The method of procedure followed in test C was to examine carefully once each week, or ten days, and destroy all queen cells visible on the combs of brood. This method was not satisfactory so far as successfully preventing swarming was concerned. Crowding or congestion of the brood nest is the main cause of swarming and, as the building of queen cells prior to swarming is only the effect of the congestion, it is obvious that the destruction of the cell is not removing the cause.

COMPARISON OF DIFFERENT SIZES OF HIVES

A comparison of ten-frame Jumbo hives and ten-frame Langstroth hives for six seasons showed that with the Jumbo hive less swarming occurred, and also that a slightly better production of honey was obtained. It was noticeable each year that there were more supersedure cells built in the Lagnstroth as compared to the Jumbo hives.

It will appear that the ten frame Jumbo brood chamber is large enough to accommodate any ordinary prolific queen and, by providing ample room, reduces congestion materially.

PROTECTED VERSUS UNPROTECTED HIVES DURING SUMMER

This experiment was begun in 1925 to determine whether a colony that was protected during the summer months by a protective case would yield a larger crop of honey than one that was unprotected.

Three groups of ten-frame Langstroth hives that had been wintered in single-colony cases were selected. During the summer one group had "lifts" added to protect the honey supers as well as the brood chamber, one group had the brood chambers left packed in the wintering cases, but without the honey supers being protected, and the last group left with no protection. There was no increase made from any of these colonies, but when one swarmed the queen cells were destroyed, in the parent colony, and the issuing swarm was hived beside the old stand. Nine days later the queen cells were again destroyed and the swarm placed on top of the old hive.

Five years' results of the test indicate that the colonies in the fully protected hives showed a decided inclination to swarm, while those with only the brood chamber protected had less inclination, and the unprotected hives least of all. In honey production, over the five years, the fully protected hives yielded less than either of the others, for the average annual yield per colony was: fully protected hives, 94·6 pounds honey; brood chamber only protected, 108·8 pounds; and unprotected hives, 104·8 pounds. These results would indicate that, at Lethbridge, summer protection of hives is not only not required, but that the protection appears to be undesirable.

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