DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT

W. H. FAIRFIELD, M.Sc., LL.D.

FOR THE YEAR 1930

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DOMINION EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.Sc., LL.D.

The crop season of 1930 opened fairly early, following a winter of average temperatures and snowfall. The first work started on the land was on April 1, and work was general in the district on April 7. As the first half of April was dry, field operations progressed rapidly and much of the seeding was completed by the end of that month.

There was a good supply of moisture in the soil carried over from rains of the previous September and October, and this, supplemented with moderate precipitation in the last half of April and the first two weeks of May, supplied sufficient moisture for an almost perfect germination of spring sown seeds, and furnished all the water needed by the crops until the first of June. There was little rainfall in the latter part of May, and the June precipitation was below average, so that it was necessary to commence irrigating field crops early in June and irrigation was continued almost without interruption until August 23.

Dry land grain not on summer-fallow commenced to suffer for water about the middle of June, but was revived some by intermittent storms that came until July 19. Between that date and August 20 there was no effective rainfall and the drought injury to crops was serious, with the result that grain on land that had produced a crop the previous year yielded less than half as much as that seeded on good summer-fallow.

Due to the dry season, harvesting started earlier than usual, was well under way by the first of August, and most of the grain was cut by the first of September. Almost ideal harvest weather prevailed during this period.

The harvesting of the 14,500 acres of sugar beets in the district commenced on September 23 and was about one-half completed by October 15, when a skit of snow accompanied by temperatures ranging down to nine degrees above zero stopped the beet harvest. The ground was frozen to a depth of five inches, but thawed out in about a week and farmers were able to harvest the balance of the crop. The beets were seriously injured however and from ten to fifteen thousand tons were a total loss.

After this week of low temperatures in October the weather remained moderate until November 11 when a snowfall of nine inches was received. The weather again moderated after ten days of freezing weather and the snow which had fallen on unfrozen ground melted and soaked into the soil.

From November 19 until the end of the year the thermometer did not register lower than ten degrees above zero, and very little precipitation was received.

35773—1½

METEOROLOGICAL RECORDS AT LETHBRIDGE, ALBERTA, 1930

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		1930	Average 29 years
	°	°	°		miles			in.	in.	in.
January	37	−38	4·4	98·9	8·7	31	N	.....	0·37	0·65
February	60	−13	32·7	117·9	14·9	47	SW	.....	0·20	0·67
March	60	−15	30·3	153·8	10·75	40	SW	.....	0·77	0·72
April	79	22	47·0	218·3	10·8	*38	W	.....	1·53	1·04
May	73	30	49·7	211·7	11·1	33	SSW	.....	1·54	2·46
June	86	38	57·2	268·0	9·7	32	SW	6·27	1·42	2·90
July	94	41	64·7	363·5	6·9	24	SW	8·03	1·87	1·85
August	94	36	65·3	311·3	5·7	22	SW	6·77	0·57	1·68
September	85	30	53·8	165·3	7·8	30	SW	5·57	2·36	1·79
October	70	9	39·8	156·9	9·7	39	SW	1·93	0·58	0·87
November	67	−12	34·2	114·8	12·5	36	SW	.....	0·92	0·66
December	55	14	35·1	133·8	15·4	38	SW	.....	0·21	0·65
Total	.....	.....	.....	2,313·4	.....	.....	.....	*28·57	12·34	15·94
Monthly average	71·7	11·8	42·8	192·8	10·3	34·2	.....	*5·71	1·03	1·33

*5 months total and average.

The last spring frost occurred on May 23, when 32° F. above zero was registered. The last killing frost was on April 21, with a minimum temperature of 29 F.

The first fall frost occurred on September 23, with a temperature of 32° F. and the first killing frost October 15, when the thermometer registered 17° F.

LETHBRIDGE MONTHLY PRECIPITATION FIGURES FOR 29 YEARS

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Year
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
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	2·63	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	2·43	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	1·43	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	2·20	0·40	1·91	19·71	1929
1930...	0·37	0·20	0·77	1·53	1·54	1·42	1·87	0·57	2·36	0·58	0·92	0·21	12·34	1930
Average 29 years	0·65	0·67	0·72	1·04	2·46	2·90	1·85	1·68	1·79	0·87	0·66	0·65	15·94	1·33

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.

FROST RECORD FOR TWENTY-NINE YEARS—DOMINION EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

Year	Last frost, spring		First frost, fall		Number of frost free days	Last killing frost, spring		First killing frost, fall		Number of crop days
	Date	Temperature	Date	Temperature		Date	Temperature	Date	Temperature	
		°F.		°F.			°F.		°F.	
1902	5— 9	32·0	8—29	31·9	112	4—24	20·5	9—20	27·5	149
1903	5—22	29·6	8—13	31·1	83	5—21	26·0	9—30	26·5	132
1904	5—29	29·9	9—13	27·1	111	4—18	25·0	9—13	27·1	148
1905	5—19	32·0	9—30	28·8	134	5— 5	28·0	10—10	24·8	158
1906	5—27	32·0	8—25	31·2	90	4—30	25·0	10—21	23·0	174
1907	5—13	23·0	9—11	31·9	121	5—13	23·0	10—17	24·0	157
1908	5— 2	32·0	9—23	32·0	144	4—30	26·5	9—26	19·2	149
1909	5—29	29·8	8—28	29·8	91	5— 8	25·4	9—14	26·8	129
1910	6— 4	31·0	8—23	31·5	80	5—20	27·4	9—12	26·3	115
1911	5—28	29·6	8—27	29·4	91	5— 1	25·2	9—23	26·3	145
1912	6— 6	28·3	9—15	24·0	101	5— 4	24·5	9—15	24·0	134
1913	5—12	29·2	9—12	32·0	23	5— 6	24·8	9—24	26·2	141
1914	5—12	29·8	9—15	31·0	126	5—11	24·1	10—7	20·1	149
1915	5—15	31·0	9—11	31·2	119	4—11	28·0	9—28	24·0	170
1916	5—23	31·6	9—14	31·2	114	4—25	21·0	9—28	24·0	156
1917	6— 4	31·0	9— 1	32·0	89	5—30	28·0	9—15	27·0	108
1918	6— 6	32·0	9—15	28·0	101	5—26	21·0	9—15	28·0	112
1919	6— 1	31·0	9—26	32·0	117	5—14	27·0	9—29	26·0	138
1920	6— 3	29·0	9—19	30·0	108	5—30	26·0	9—36	24·0	119
1921	5—31	30·0	9— 9	32·0	101	5—28	24·0	9—24	27·0	119
1922	5—23	29·0	10— 7	30·0	137	5— 6	28·0	10—11	21·0	158
1923	5—29	29·5	9—11	29·0	105	5—15	28·0	9—22	25·0	130
1924	5—26	31·5	9—20	28·5	117	5— 6	25·5	9—26	26·0	143
1925	5—17	30·0	9—20	25·5	126	5—11	24·0	9—20	25·5	132
1926	5—27	32·0	9—11	30·0	107	5— 2	28·0	9—20	26·0	141
1927	5— 9	26·0	9— 8	32·0	122	5— 9	26·0	9—26	29·0	140
1928	5—14	31·0	8—14	31·0	92	4—22	28·0	9— 8	26·0	139
1929	5—19	32·0	8—16	28·0	89	5— 7	26·0	8— 6	26·0	113
1930	5—23	32·0	9—23	32·0	123	4—21	29·0	10—15	17·0	176
Average	5—23	30·23	9—10	30·14	109·4	5— 8	25·62	9—24	24·9	140·5

ANIMAL HUSBANDRY

HORSES

The horses now at this Station number twenty head. Two aged geldings were disposed of during the year. Of the six Percheron females bred last year, three gave birth to foals, two of which died leaving one foal at the end of the season of 1930. The nine head of Percheron females are in good condition and six of them are bred to foal in 1931. No experimental work with horses has been conducted during the current year.

DAIRY CATTLE

The dairy herd of pure bred Holstein-Friesian cattle slightly increased in number during the year, there being a total of thirty-two head of registered cattle on December 31, 1930, as compared with twenty-nine a year previous.

Agassiz Faforit Re-Echo is retained as senior and Lethbridge Faforit Butter Boy as junior herd sire. Two young bulls were sold during the year and five bull calves are on hand at the end of 1930. One heifer, Lethbridge Agassiz De Kol, failed to breed and was sold for slaughter. Lethbridge Canaan Princess, a four-year-old cow of undesirable type, and all grades were also sold, consequently all dairy cattle at this Station at the present time are pure bred.

HEALTH OF DAIRY HERD

The general health of the dairy herd has been good. The Health of Animals Branch applied the tuberculin test which was successfully passed as well as sera tests for contagious abortion, all animals in the herd giving a negative reaction.

Two two-year-old heifers, Lethbridge Daisy and Lethbridge McKinley Beauty, which calved during November, lost their calves at birth due to abnormal presentations, and at the end of the year were still suffering from the after effects. Some udder troubles have also been encountered.

The following table gives the milk produced by each cow in the herd which was milked for more than four months of the calendar year.

REPORT OF MILK PRODUCTION IN POUNDS

Name and number of cow	Age (years)	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Butterfat	
														lb.	lb.	%
L. E. S. Korndyke Helbon—91372	9	1,565·5	1,409	1,381	1,275	1,274·5	1,330·5	1,215·5	1,086·5	880·5	767·5	611·0	549·5	13,346·0	427·07	3·20
L. E. S. Ianthe Aaggie DeKol—76079	10	1,173·5	1,023·5	1,082·5	971·5	955·5	885·5	898	873	782·5	647·5	586·5	534·5	10,414·0	333·25	3·20
Spruce Farm Queen—124357	8	594	94	.....	.....	330	1,231	1,859	1,893	1,688	1,571	1,261	1,046	11,522·0	351·56	3·05
Spruce Farm Bertha—125322	8	565·5	109	.....	.....	433·5	2,491·5	2,800·5	2,432·5	1,994·7	1,721·5	1,256·5	1,019·5	14,824·7	451·07	3·05
Lethbridge Lady Hengerveld—167475	4	1,533	1,338·5	1,264	928·5	900·5	655·5	559	448·5	188·5	.....	.....	.....	7,816·0	250·11	3·20
Lethbridge Korndyke Duplicate—191650	3	.....	303	1,389·5	1,462	1,523·5	1,345·5	1,371	1,322·5	1,137	1,059	998	894	12,805·0	427·45	3·34
Lethbridge McKinley Ianthe—189231	3	.....	.....	828	1,842·5	1,802·5	1,386	1,353·3	1,338	1,102·7	991	820·5	897·5	12,362·2	342·92	2·77
Lethbridge Pietje Beauty—191652	3	.....	.....	954	1,545·5	1,504	1,347	1,291	1,241·5	1,027	935·5	832·	820·5	11,498·0	296·12	2·57
Lethbridge Pietje—191651	3	.....	.....	401	1,516·5	1,607·5	1,385·5	1,265·5	1,204	949	883·5	667	753·5	10,633·0	264·98	2·49
Lethbridge McKinley Maple—189230	3	.....	.....	197·5	1,451·5	1,450	1,288·5	1,262	1,074·5	941·5	826·5	718	738·5	9,948·5	293·92	2·95
Lethbridge Pietje Duplicate—191649	3	.....	.....	221·5	1,591	1,673	1,361	1,297	1,217·5	1,007	934·5	758·5	805	10,866·0	309·16	2·85
Lethbridge McKinley Hengerveld—189233	3	.....	.....	.....	.....	.....	.....	1,517	1,713·5	1,545	1,535	1,197	967·5	8,475·0	238·42	2·81
Total	.....	5,386·5	4,277·0	7,719·0	12,584·0	13,454·5	14,707·5	16,689·0	15,845·0	13,243·4	11,872·5	9,706·0	9,026·0	134,510·4	3,986·03	

Average per cow: 11,209·2 pounds of milk—332·17 pounds butterfat, Average % 2·96.

The average production for each cow was 11,209·2 pounds of milk. This represents a slight decrease from the herd average of 1929, due to the inclusion of seven two-year-old heifers in the herd.

CREAM GRADES AND PRICES

The cream delivered during 1930 to the local creamery graded as follows:—

Table	50·3 per cent
Special	41·0 per cent
No. 1	8·7 per cent
No. 2	Nil.
No. 3	Nil.

The average prices received for butterfat sold during 1930 from the Station were as follows:—

April to September, inclusive—	
Table	35·70 cents per pound
Special	26·56 cents per pound
No. 1	24·92 cents per pound
January—March and October—December:—	
Table	37·90 cents per pound
Special	28·59 cents per pound
No. 1	26·80 cents per pound

SWINE

A breeding herd of twenty pure bred Yorkshire sows was maintained throughout the year. A junior herd sire, Lacombe Dalmeny 19 —140675— has been secured from the Lacombe Experimental Station. The swine herd on December 31, 1929, numbered two hundred and twenty-four head and on December 31, 1930, one hundred and twenty-four.

It is the policy of the farm to sell pure bred breeding stock at moderate prices to farmers, especially where the demand is not being supplied by private breeders, and during 1930 sixty-six head were thus sold. In addition to these sold for breeding purposes one hundred and eighty-nine market hogs were disposed of.

PEAS FOR "HOGGING OFF"

On August 19 two groups of pigs were turned into a pasture of four and a half acres of Mackay peas. One group consisted of ten head averaging 144·9 pounds each and the other group of fifteen head averaged sixty-nine pounds each. No additional feed of any kind was supplied. The pigs had free access to water in a lake and were housed in portable hog cabins.

Individual weights were taken at the beginning of the experiment and on September 18, October 6, and October 16. At the time of the second weighing, September 18, one pig from the heavy lot was sold. The remaining nine from this lot had reached a finished weight on October 6 and were disposed of. The light weight lot was removed October 16 by which time the peas had been consumed.

During the time of the experiment the twenty-five pigs made a total gain of 1,510 pounds. The ten heavy pigs averaged 54·54 pounds gain, or 1·11 pounds daily, while the fifteen lighter pigs averaged 66·13 pounds gain, or 1·12 pounds daily. The greater average gain in the lighter lot was therefore due to the longer period on feed.

The gain made during the experiment valued at the then current price for pork of ten cents per pound would amount to a total of $151, which makes a return of $33.56 per acre for the peas.

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ADVANCED REGISTRATION OF SWINE

In the 1929 report of this Station ten sows were mentioned as being entered in the Advanced Registry policy, which is conducted by the Dominion Live Stock Branch. The Advanced Registry policy has been inaugurated with a view of selecting the individuals 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. In order to accomplish this the performance of the pure-bred sows is measured accurately and recorded authentically under three main heads: first, the sow's productive capacity; second, the capacity of the sow's progeny for early maturity; third, the quality of the progeny as revealed from the slaughter test. A sow to qualify must do so for all three counts, scoring 40 under the first division, 100 under the second, and 75 out of a possible 100 under the third division.

We quote here from a Department of Agriculture pamphlet:—

Advanced Registry is not designed, as some suppose, to take the personal initiative away from a breeder. It is in no way advisable that this be so. What it is designed to do, however, is to give the breeder more knowledge of his pigs, afford him reliable information, which he can get in no other way, and with which he can supplement his own personal judgment in selecting live breeding animals, thus forming the basis of a more reliable and informative pedigree in keeping with the demand of the day.

Perhaps the most significant feature of the policy is the establishment of commercial values, which automatically eliminate, through testing, all poor sows in the herd. On the other hand, the added credits and values, which attach themselves to sows which qualify and to families which show consistently high performance, will centre attention on such individuals and families, thus enhancing their value as avenues of breeding stock for the general improvement of swine.

Of the ten sows entered here one was withdrawn on account of unsatisfactory litter. The results from the other nine sows are shown in the following table:—

ADVANCED REGISTRY FOR SWINE—SCORING OF SOWS

Breeder: Experimental Farm, Lethbridge, Alta.

Score Necessary to Qualify under Tentative Standard:—Production, 40; Maturity Index, 100; Slaughter Test, 75.

Sow	Production	Maturity index	Slaughter Test							
			Weight of carcass	Length	Back fat and finish			Balance of side	Belly	Total
					Thickness	Evenness	Finish			
1A	55	92	6	22	6	8	6	14	15	77
1D	40	86	8	20	6	8	6	16	15	79
1H	50	87	8	16	8	8	8	14	20	82
1I	45	93	4	24	6	6	8	14	20	82
1J	45	81	6	19	8	8	8	14	20	83
1L	40	84	8	17	8	8	8	10	15	74
1M	45	81	8	21	6	8	6	16	20	85
1N	35	85	8	24	4	8	6	12	10	72
1T	40	92	8	19	8	8	8	20	20	91

In this table it will be seen that only sow IN failed in production and slaughter test, and sow IL in the slaughter test. All of the sows, however, failed to score sufficient points under the Maturity Index; that is, their progeny did not mature quickly enough.

The five sows entered as a second lot in the Advanced Registry Policy gave the following results:—

ADVANCED REGISTRY FOR SWINE—SCORING OF SOWS

Breeder: Lethbridge Exp. Farm

Score Necessary to Qualify under Tentative Standard: Production, 40; Maturity Index, 100; Slaughter Test, 75

Sow	Production	Maturity index	Slaughter test							
			Weight of carcass	Length	Back fat and finish			Balance of side	Belly	Total
					Thickness	Evenness	Finish			
1I	45	101	8	22	8	8	8	18	20	92
1U	35	94	8	23	8	8	8	18	20	93
1N	35	100	8	24	8	8	8	18	17	99
1A	55	102	6	22	6	6	8	18	20	86
1H	50	99	8	24	8	8	8	20	15	91

As will be seen in the second table, the sows II, IN, IA, and IH show a considerably better score in maturity index and slaughter than they did in the first test. When the pigs in the first lot were slaughtered it was discovered that they were infested with worms, which caused the slow gain. Care was then taken not to have this repeated, and consequently the second lot shows more rapid gains.

A summary of results of the two tests shows that the amount of grain necessary to produce a pound of gain varied from 4·13 to 5·5 pounds in the first group, and from 3·49 to 4·22 in the second group. The decrease in amount of grain necessary in the second lot may be partly due to the fact that this lot received considerably greater amounts of both milk and tankage during the growing period.

BEEF CATTLE

With the present extremely low grain prices greater interest is evinced in cattle feeding. In the summer of 1929 a Red Label Beef Breeders and Feeders Association was formed at Lethbridge in the hope of enabling ranchers and farmers to establish a profitable co-operative beef feeding scheme. Under this scheme the Association lets out calves and yearlings for fattening and therefore these classes of cattle were used in the feeding trials at this Station during the winter of 1929-30 instead of two-year olds which had been used in previous feeding tests. In addition to the winter feeding trials a test was carried out during the summer of 1930 to determine the feasibility of putting well wintered calves on sweet clover pasture and by feeding a liberal grain ration have them finished and ready for market in late summer when only an indifferent supply of grass finished cattle would be available.

In November 1929, twenty-eight yearling steers and twenty-eight calves, all of Hereford breeding, were purchased from the Ross Ranching Company, St. Kilda. They were put on stubble pasture and fed some hay in addition until they had passed the T. B. Test. As the yearlings arrived earlier in November than the calves they were held on the pasture for six weeks and were set back considerably. On December 16 the cattle were divided as evenly as possible into two groups of yearlings and two groups of calves. Each group was weighed on three successive days the average for the three weights being used as the initial weight, and the feeding trial commenced December 19. Two calves suffered from pneumonia at this time and were not included in the trials. The groups were fed as follows:—

Group No. 1, Thirteen calves, fed alfalfa hay and a full ration of oats and barley chop, also some boiled barley and ground flax.

Group No. 2. Thirteen calves, fed alfalfa and a half ration of oats and barley chop.

Group No. 3. Fourteen yearlings, fed alfalfa hay, full ration oats and barley chop, boiled barley and ground flax.

Group No. 4. Fourteen yearlings, fed alfalfa hay and a half ration of oats and barley chop.

The cattle had access to hay at all times in racks in the corrals. The first few days timothy hay was fed and this was gradually changed to alfalfa hay in order to prevent ill effects from a sudden change to alfalfa, which was of good quality and might possibly have caused bloat if some precaution had not been taken. Chopped oats were fed until January 15, starting at a rate of two pounds per head daily. One pound of chopped barley per head was then added to the daily ration and gradually increased so that on March 6, the following amounts of grain were fed daily per head: Group No. 1, 7 pounds; Group No. 2, 3·5 pounds; Group No. 3, 9 pounds, and Group No. 4, 4·5 pounds, consisting of half oats and half barley. In addition to this, Groups 1 and 3 were fed one pound of boiled barley, weighed dry, and one-quarter of a pound of ground flax per head daily. On April 2 the maximum amount of grain fed per day was reached, namely: Group No. 1, 8 pounds; Group No. 2, 4 pounds; Group No. 3, 10 pounds, and Group No. 4, 5 pounds per head. The ration at this time consisted of two parts barley and one part oats, not counting the small amount of boiled barley and ground flax fed to Groups 1 and 3. Feeding of corn silage commenced January 16, at a rate of one pound per head daily and was gradually increased so that on April 1, Groups 1 and 2 received five pounds and Groups 3 and 4 seven pounds per head daily, which amount was fed during the remaining period of the trial.

The following tabulations give the results of the trial:—

CATTLE FEEDING TRIALS 1929-1930—DECEMBER 19-MAY 26-APRIL 30

Item		Group No. 1, calves—alfalfa hay, oats and barley chop, boiled barley, ground flax	Group No. 2, calves—alfalfa hay, oats and barley chop	Group No. 3, yearlings—alfalfa hay, oats and barley chop, boiled barley, ground flax	Group No. 4, yearling—alfalfa hay, oats and barley chop
		Full grain ration	Half grain ration	Full grain ration	Half grain ration
Number of cattle at beginning of trial		13	13	14	14
Number of cattle at end of trial		13	13	14	14
Number of days in trial		158	158	132	132
Total initial weight	lb.	5,710	5,555	9,233	9,300
Average initial weight	"	439·2	427·3	659·5	664·3
Total final weight	"	9,850	8,910	13,185	12,320
Average final weight	"	757·7	685·4	941·8	880
Total gain for period	"	4,140	3,355	3,952	3,020
Average gain per head	"	318·5	258·1	282·3	215·7
Average daily gain per head	"	2·02	1·63	2·14	1·63
Total feed consumed:—					
Timothy hay	lb.	1,310	1,210	1,580	1,770
Alfalfa hay	"	24,220	28,030	28,500	35,250
Corn silage	"	6,105	7,161	6,835	7,818
Barley chop	"	6,746	3,639	6,976	3,822
Oat chop	"	6,352	3,897	8,458	5,401
Boiled barley (dry weight)	"	1,391	.....	1,134	.....
Ground flax	"	325	.....	259	.....
Salt	"	30	30	30	30
Hay per pound of gain	"	6·17	8·72	7·61	12·26
Grain per pound of gain	"	3·58	2·25	4·27	3·05
Silage per pound of gain	"	1·47	2·13	1·73	2·59
Total feed per pound of gain	"	11·22	13·10	13·61	17·90

CATTLE FEEDING TRIALS, 1929-1930

Item		Group 1—calves	Group 2—calves	Group 3—yearlings	Group 4—yearlings
Feed consumed per head					
Hay	lb.	1,963·8	2,249·2	2,148·6	2,644·3
Corn silage	"	469·6	550·8	488·2	558·4
Barley chop	"	518·9	279·9	498·3	273·0
Oat chop	"	488·6	299·8	604·1	385·8
Boiled barley (dry weight)	"	107·0	.....	81·0	.....
Ground flax	"	25·0	.....	18·5	.....
Average daily consumption per head:					
Hay	lb.	12·4	14·2	16·3	20·0
Silage	"	3·0	3·5	3·7	4·2
Barley chop	"	3·3	1·8	3·8	2·1
Oat chop	"	3·1	1·9	4·6	2·9
Boiled barley	"	0·7	.....	0·6	.....
Ground flax	"	0·16	.....	0·14	.....
Total weight of concentrates including oats and barley but not ground flax		7·1	3·7	9·0	5·0

One important factor in cattle finishing trials is to have the tests from different years and localities comparable. For this reason the results in the foregoing tables are expressed in quantities of feed required per pound of gain rather than in dollars and cents. However, as the financial side of a feeding trial is of vital interest to a feeder a financial statement is herewith submitted.

FINANCIAL STATEMENT OF CATTLE FEEDING TRIALS, 1929-1930

Item		Group 1, 13 head of calves	Group 2, 13 head of calves	Group 3, 14 head of yearlings	Group 4, 14 head of yearlings
Cost of cattle at $40 per head for calves and $50 for yearlings	$	520 00	520 00	700 00	700 00
Hay at $12.50 per ton	$	159 56	182 75	188 00	231 38
Silage at $3.50 per ton	$	10 68	12 53	11 96	13 68
Barley at 69 cents per bushel or $28.80 per ton	$	117 17	52 40	116 78	55 04
Oats at 53 cents per bushel or $31.20 per ton	$	99 09	60 79	131 94	84 25
Flax at $2 per bushel or $66 per ton	$	10 73	.....	8 55	.....
Salt at $30 per ton	$	0 45	0 45	0 45	0 45
Feed cost	$	397 68	308 92	457 68	384 80
Cost of cattle and feed	$	917 68	828 92	1,157 68	1,084 80
Selling price:					
Group 1, 12 head, 9,150 pounds at 10·25 cents per pound; 1 head, 700 pounds at 9·75 cents per pound; Premium $1 per head for 13 head	$	1,019 13			
Group 2, 4 head, 2,940 pounds at 10·25 cents per pound; 9 head, 5,970 pounds at 8·25 cents per pound	$	.....	793 88		
Group 3, 10 head, 9,465 pounds at 11 cents per pound; 3 head, 2,810 pounds at 10·5 cents per pound; 1 head, 910 pounds at 10 cents per pound	$	.....	.....	1,427 20	
Group 4, 6 head, 5,825 pounds at 11 cents per pound; 2 head, 1,730 pounds at 10·5 cents per pound; 4 head, 3,345 pounds at 10 cents per pound; 2 head, 1,420 pounds at 9·5 cents per pound	$	.....	.....	.....	1,291 80
Profit or loss (−) per group	$	101 45	−35 04	269 52	207 00
Profit or loss (−) per head	$	7 80	−2 70	19 25	14 79
Cost of feed per head	$	30 59	23 76	32 69	27 49
Feed cost per pound of gain	ct.	0·096	0·092	0·116	0·127
Average buying price per pound	ct.	0·091	0·094	0·076	0·075
Average selling price per pound	ct.	0·104	0·089	0·108	0·105
Spread *i.e.*, difference between buying and selling price	ct.	0·012	0·004	0·032	0·029

The yearlings were finished first and sold on a higher market than the calves which accounts to some extent for the greater profits returned by them. Had the calves been sold two weeks earlier, they would have brought 11 cents per pound instead of $10\frac{1}{4}$ cents. For the same reason the appraised selling price for Group 2 dropped below the purchase price which resulted in a loss of $2.70 per head. This trial confirms results of previous trials indicating that it is more profitable to feed a full grain ration.

FATTENING BEEF CATTLE ON IRRIGATED SWEET CLOVER PASTURE

During the summer of 1930 a feeding trial was conducted with beef cattle on irrigated sweet clover pasture supplemented with grain. For this purpose twenty head of yearlings were purchased from the Ross Ranching Company, and to this number were added twelve head held over from the winter feeding trials, making a total of thirty-two head placed on pasture on June 5.

A lake to which the cattle had access at all times at one end of the pasture provided them with water. They did well during the summer except for the fact that cases of bloat were common. In fact during the early part of the period the animals were on pasture two were lost. Grain feeding was commenced on June 10 and by June 12 they were being fed three pounds of equal parts of oat and barley chop per head daily. The first death from bloat occurred during the night of June 13, and the second June 23. By this latter date the grain ration had been increased to five pounds per head fed in equal portions morning and night. As the deaths occurred during the night in both cases it was thought that the cause might be that the calves were well filled with clover from the day's grazing and the grain ration added to this caused the fatal bloat.

After the second death grain feeding in the evening was discontinued and although cases of bloat continued to occur, none of these proved fatal. On July 15 evening grain feeding was recommenced at the rate of one pound per head and this was gradually increased until on September 3 the calves were receiving seven pounds of grain, two-thirds barley and one-third oats, daily; four pounds being fed in the morning and three pounds at night.

The experiment was concluded on September 15. The cattle were disposed of through the Southern Alberta Co-operative Association who shipped them to Winnipeg where they were sold.

In the following tables giving the details of the experiment the results in the first table are based on thirty head, whereas in the second table, the financial statement, account is taken of the two that died.

CATTLE FEEDING TRIAL ON IRRIGATED YELLOW SWEET CLOVER PASTURE, JUNE 4, SEPTEMBER 15, 1930

Number of cattle at beginning of trial		30
Number of cattle at end of trial		30
Number of days on trial		103
Total initial weight	lb.	16,794
Average initial weight	lb.	559·8
Total final weight	lb.	24,690
Average final weight	lb.	283
Total gain	lb.	7,896
Average gain per head	lb.	263·2
Average daily gain per head	lb.	2·56
Grain per pound of gain	lb.	1·71
Total grain fed	lb.	13,512
Oats	lb.	6,224·2
Barley	lb.	7,287·8
Salt	lb.	100
Average amount of grain fed per head	lb.	450·4
Average amount of grain fed daily per head	lb.	4·37

COMPARISON OF BEEF CATTLE ON SWEET CLOVER PASTURE

Items		Group I—put on pasture off range	Group II—grain fed in corrals during previous winter
Number of cattle at beginning of trial*		18	12
Number of cattle at end of trial		18	12
Number of days on trial		103	102
Total initial weight	lb.	8,874	7,920
Average initial weight	lb.	493	660
Total final weight	lb.	14,205	10,485
Average final weight	lb.	789·2	873·8
Total gain	lb.	5,331	2,565
Average gain per head	lb.	296·2	213·8
Average daily gain per head	lb.	2·88	2·10

*To simplify a study of the gains the two head lost from bloat from the range wintered lot are eliminated from this table.

FINANCIAL STATEMENT OF FINISHING BEEF CATTLE ON SWEET CLOVER PASTURE

20 head purchased June 4,		
9,960 pounds (buying weight) at 8 cents		$ 796 80
12 head kept over winter,		
7,920 pounds, average appraised value 8·38 cents		663 70
6,250 pounds oats at 53 cents per bushel, or $31.20 per ton		97 50
7,316 pounds barley at 69 cents per bushel, or $28.80 per ton		105 35
100 pounds salt at $30 per ton		1 50
Total (out-of-pocket) cost, as no charge is included for pasture		$ 1,664 85
Selling price:—25 head, 20,130 pounds at 9 cents	$ 1,811 70	
4 head, 3,210 pounds at 8 cents	256 80	
1 head, 800 pounds at 7 cents	56 00	
30 head	$ 2,124 50	
Less freight, feed, handling charges and insurance	242 43	
Net return	$ 1,882 07	
Profit		$ 217 22
Total	$ 1,882 07	$ 1,882 07
Profit per head (32 head)		$ 6 79
Cost of grain and salt per 100 pounds gain		2 96
Average selling price per cwt		7 80

The total final weight given in the first table is the feed lot weight taken just previous to the removal of the cattle from the Station and the weight in the financial statement as presented in the second table is the weight on which they were sold at Winnipeg. The latter weight is only 2·2 per cent less than the feed lot weight and is an unusually light shrink.

Satisfactory results were obtained from this pasture experiment, for in spite of the loss of two steers and the fact that the selling price was from 20 to 58 cents per cwt. less than the cost price of the steers they returned an average profit of $6.79 per head.

A pasture charge of $0.75 per head per month was made which would give a total pasture charge of $79.50. Subtracting this from the net profit shown in the second table would leave an actual net profit of $137.52 or $4.58 per head to cover labour costs and interest on investment.

The steers fed at this Station during the winter did not make as good gains during the summer as those that came directly from the range. However, it is noteworthy that the two dead calves belonged to the latter group. Another factor to be mentioned was the presence of eight heifers in the range group. At certain times these caused considerable disturbance and undoubtedly greater gains would have been made if the sex of the cattle had not been mixed. It is the intention to continue with a similar experiment during the summer of 1931.

SHEEP

LAMB FEEDING TRIALS

The lamb feeding work during the winter of 1929-30 was a continuation of the trials of previous years, which have been carried on with a view of determining the feasibility of feeding lambs with home grown feeds on an irrigated farm.

One hundred and fifty lambs were used, divided as evenly as possible into three groups. The lambs were the smallest of the wether lambs selected from our lamb crop of 1929. They were March and April lambs, which had been ranging on the Crows Nest Forest Reserve during the summer. Ninety head were of grade Rambouillet and Corriedale breeding and sixty of grade Shropshire breeding. The lambs of different breeding were divided as evenly as possible among the three groups. As in the trials of 1928-29 the lambs were all branded with individual numbers for the purpose of individual comparison.

The lambs were placed in the feed lots weighing approximately eighty pounds per head at an appraised valuation of 8·25 cents per pound. On April 5, one hundred and forty head were sold through the Southern Alberta Co-operative Association on the basis of off car weights in Winnipeg which accounts for the great shrinkage from the feed lot weight as shown in a following table. The Winnipeg price was 8·42 cents per pound. The ten remaining lambs were valued at seven cents per pound and held at this Station for local consumption.

The various groups were fed as follows:—

Group No. 1. First cutting alfalfa hay, full grain ration.

Group No. 2. Second cutting alfalfa hay, full grain ration.

Group No. 3. Second cutting alfalfa hay, half grain ration.

Groups 1 and 2 were gradually brought up to the daily grain ration of two pounds which consisted of two parts of barley and one part of oats. Group 3 was fed half of this amount.

LAMB FEEDING TRIALS, 1929-30—DEC. 21, 1929, TO APRIL 4, 1930

Items		Group No. 1, first cutting alfalfa hay, oats and barley, full grain ration	Group No. 2, second cutting alfalfa hay, oats and barley, full grain ration	Group No. 3, second cutting alfalfa hay, oats and barley, half grain ration
Number of days on trial		104	104	104
Number of lambs on trial		50	50	50
Total initial weight	lb.	4,020	4,037	3,865
Average initial weight	"	80·4	80·7	77·3
Total final weight	"	5,960	5,940	5,310
Average final weight	"	119·2	118·8	106·2
Total gain per group	"	1,940	1,903	1,445
Average gain per lamb	"	38·80	38·06	28·90
Average daily gain	"	0·373	0·366	0·278
FEED CONSUMED				
Oats consumed per group	"	2,978	2,978	1,631
Barley consumed per group	"	5,952	5,952	3,264
Total grain per group	"	8,930	8,930	4,895
Alfalfa hay per group	"	11,010	11,850	13,470
Hay fed per lamb	"	220·20	237	269·40
Oats fed per lamb	"	59·56	59·56	32·62
Barley fed per lamb	"	119·04	119·04	65·28
Hay per pound of gain	"	5·68	6·23	9·32
Oats per pound of gain	"	1·54	1·56	1·13
Barley per pound of gain	"	3·07	3·13	2·26

FINANCIAL STATEMENT OF LAMB FEEDING TRIALS, 1929–1930

Item	Group No. 1: first cutting alfalfa hay, oats and barley—Full grain ration	Group No. 2: second cutting alfalfa hay, oats and barley—Full grain ration	Group No. 3: second cutting alfalfa hay, oats and barley—Half grain ration
Cost of lambs (Dec. 21) at $8.25 per cwt.	$ 331 65	333 05	318 86
Value of hay at $12.50 per ton	$ 68 81	74 06	84 19
Value of oats at $31.20 per ton	$ 46 46	46 46	25 44
Value of barley at $28.80 per ton	$ 85 71	85 71	47 00
Value of salt at $30 per ton	$ 0 75	0 75	0 75
Total value of feed	$ 201 73	206 98	157 38
Cost of lambs and feed	$ 533 38	540 03	476 24
Feed cost per pound of gain	$ 0·1039	0·1087	0·1089
RETURNS:			
49 head, 5,880 pounds, less 10 p.c. shrink, 5,292 pounds at 8·42 cents	$ 445 59		
Less handling charge, 25 cents per cwt.	13 23		
1 head, 80 pounds at 7 cents	5 60	437 96	.....
50 head, 5,940 pounds less 10 p.c. shrink, 5,346 pounds at 8·42 cents	450 13		
Less handling charge, 25 cents per cwt.	13 37		
	.....	436 76	.....
41 head, 4,460 pounds less 10 p.c. shrink, 4,014 pounds at 8·42 cents	337 98		
Less handling charge, 25 cents per cwt.	10 04		
9 head, 850 pounds at 7 cents	59 50		
			387 44
Loss per group	$ 95 42	103 27	88 80
Loss per head	$ 1 91	2 07	1 78

The data contained in the foregoing table would indicate that there is no significant difference in the feeding value of first and second cutting alfalfa for lambs. In this experiment the quality of both kinds of hay fed was particularly good. The first cutting hay fed to group No. 1 was not coarse as it had been cut before many of the plants were in bloom. Had it been cut at a later period of development, similar to that at which most alfalfa in the district is commonly harvested, the stems would have been coarser and a smaller proportion of the leaves would have been saved, and the results in the feed lot might have been different to those reported on in this trial.

The opinion is very general among farmers that the second or last cutting of alfalfa is of much higher feeding value than is the first cutting. The results of this trial do not support this idea, at least when a high quality of first cutting hay is used. The fact that group No. 2 ate slightly more hay than did group No. 1, would indicate that the second cutting hay possessed greater palatability, but it is interesting to note that this slightly greater consumption of hay did not result in a greater gain, in fact, the reverse was the case. Although the difference in gain made by the two groups was not great enough to be of real significance.

In the financial statement the outstanding fact is the loss per head. The relatively high value of grain and hay, during the fall of 1929 and the early part of 1930, necessitated a high feed cost and this, combined with the fact that the lamb price was low in the spring, resulted in an inevitable loss. The fact that feeder lambs were worth 8¼ cents per pound in the fall of 1929, while the ten partially finished lambs sold for only 7 cents per pound in the following April, is significant.

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COMPARISON OF WHITE AND BLACK FACED LAMBS AS FEEDERS

During the lamb feeding trials of the winter 1928-29 comparison of the ability of the two crosses to gain in weight was commenced. In the winter trials 1929-30 this investigation was continued with the 150 lambs on trial. As previously mentioned ninety head were white faced Rambouillet and Corriedale grades, and sixty black faced Shropshire grades. The same result was obtained regarding gain, that is the black faced lambs showed the greatest gain, an averge of 38·23 pounds as compared with 31·27 pounds for the white faced lambs. However, last year the black faced ones showed greater uniformity of gain but this year the results were reversed as the coefficients of variation (determined from the standard variation) of the two lots were as follows:—

Black faced lambs	33·40
White faced lambs	27·63

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

PASTURING SHEEP ON THE FOREST RESERVE

The breeding flock of sheep did well during the summer of 1930 on the mountain range. As one of the questions most often asked concerning the matter of pasturing sheep in the Forest Reserve is in connection with the losses sustained, either from animals or otherwise, a report of the losses sustained during the past season may be of interest.

The sheep were shipped by rail May 29 to Sentinel, a siding six miles east of Crows Nest. In the shipment were 1,233 mature sheep and 857 lambs, making a total of 2,090 head. At the end of the season there were 2,031 taken out, which would mean that 59 head were lost. The total loss therefore for the summer was 2·8 per cent. The loss, as would be expected, was greater among the lambs than among the mature sheep, it being 4·78 per cent among them while only 1·3 per cent among the latter.

The lambs as usual made excellent growth and the ewes came back in particularly good condition.

CORRIEDALE SHEEP

In September of 1928 one ram and five Corriedale ewes were received at the Station from New Zealand. The ram was bred by Mr. H. T. Little of Hui Hui Hawarden, New Zealand, and the ewes were bred by Mr. O. T. Evans of Christchurch, New Zealand.

No lambs were obtained from the ewes until the spring of 1930. The reason the ewes remained barren the first year they were here was probably due to the difference in seasons and the radical change in climate between New Zealand and Canada.

In 1930 five lambs, consisting of one ram and four ewes, were raised and have developed into very fine individuals.

The object in obtaining a foundation flock of Corriedale sheep is to make it possible to carry on some experiments to determine the desirability of using an infusion of this blood to improve the quality of the ordinary range ewe. From some preliminary work that has been done it would appear that this line of work would be promising. The Corriedale would seem to "nick" in well with the ordinary range ewe of Rambouillet breeding. The offspring seems to retain all the desirable characteristics of the Rambouillet and in addition produces a

more desirable carcass. The fleece produced although in a different grade to the Rambouillet would appear to be just as desirable and would command fully as high a price.

Breeding trials are under way and will be reported upon from time to time in the future.

CEREALS*

The winter of 1929-30 was considerably colder than usual for the Lethbridge district and the ground remained covered with snow for a longer period. The spring weather commenced with much less wind than is usually experienced and ideal conditions for germinating seed prevailed. The surface soil continued moist throughout the spring season, due not only to the low evaporation, but also to periodic rainstorms. Apart from the rapid germination of the seed of all crops sown there was also a rapid germination of weed seeds. Wild oats, particularly on irrigated land, became more of a problem to farmers than they have been for many years. In a few cases grain crops were cultivated up on account of them, and in the grain harvested the dockage was heavy.

The summer was exceptionally hot and the rainfall was about equal to the average rainfall for the district for the summer season, with the result that yields approximating the average for the district were obtained on dry land, while those obtained from irrigated land were larger than usual. Farmers had taken more advantage of irrigation water the previous fall for fall irrigating, and had also commenced irrigating earlier in the spring.

Weather conditions for harvesting and threshing were exceptionally favourable. The first killing frost occurred on October 15, and there were no bad rain storms throughout the whole harvest season; consequently frost damage and weathering did not enter into the grading of grain in many cases in the fall. Combines had most favourable conditions under which to operate and the number of them used in the district has greatly increased in recent years.

DRY LAND

VARIETY TESTS

Two systems of testing different varieties of grain are employed on the dry land portion of the station. The rod-row method is used as a preliminary test for newly originated varieties or introductions. Many of the old or standard varieties are also included in this method of testing, in order to determine the comparative merits of the newer sorts. In the second system one-fortieth-acre plots are used. These plots are seeded in duplicate and just previous to harvesting the outside two rows and one foot from either end are removed, to eliminate the border effect. The seeding of these plots is done with an ordinary Van Brunt press drill, and only the more important varieties are tested by this system. In every case the plots were seeded on summer fallowed land.

WHEAT

Eleven varieties of wheat were seeded on April 8 on $\frac{1}{40}$-acre plots, the rate of seeding in each case being seventy-five pounds per acre. The following table shows the yields obtained and other information pertaining to them.

* The work with Cereals and Forage Crops is under the supervision of W. D. Hay, B.S.A., whose assistance in the preparation of the report under these headings is gratefully acknowledged.

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 Ott. 15
			in.		bush.	bush.	
Supreme	Aug. 7	121	32	10	22·67	32·86	108·13
Red Bobs 222	Aug. 7	121	31	10	19·25	31·84	104·77
Marquis 10 B	Aug. 7	121	35	10	19·33	30·65	100·85
Early Red Fife, Ottawa 16	Aug. 9	123	36	10	23·67	30·48	100·20
Marquis, Ottawa 15	Aug. 7	121	32	10	20·83	30·39	100·00
Renfrew	Aug. 7	121	35	10	23·67	29·60	97·40
Garnet Ottawa 652	Aug. 2	116	30	10	20·33	29·50	97·07
Kitchener	Aug. 9	123	34	10	24·00	29·13	95·85
Hard Federation No. 31	Aug. 7	121	30	10	20·17	28·51	93·81
Red Fife Ottawa 17	Aug. 9	123	34	10	25·00	27·87	91·71
Reward	Aug. 2	116	31	10	17·58	26·69	87·82

The two last columns giving the comparative yields of the different varieties for the past three years show Supreme and Red Bobs 222 as being the highest yielders, and outyielding Marquis Ott. 15, which is looked upon as the standard variety for the district, to the extent of almost three and two bushels respectively. They are usually slightly inferior to Marquis in colour and a few days earlier in ripening. Marquis is still recommended as the most suitable variety for the district, but where other varieties are chosen in preference to it these two selections should prove to be two of the best. Early Red Fife has been found a good yielding variety at the station, but it shatters too badly to warrant its being recommended in any part of the district. Renfrew is similar to Marquis in most respects, the chief difference being that it is usually a few days later in ripening and a few inches longer in the straw. Garnet and Reward are the two earliest varieties tested, and where the shortness of the season makes wheat raising hazardous these two varieties are recommended. While the former is the earlier the latter is preferred on account of its better milling qualities and less tendency to shatter. Hard Federation No. 31 is a white wheat and is not one which is likely to become important in Alberta.

WINTER WHEAT

A number of varieties of winter wheat have been under test for several years in a co-operative project for the United States Department of Agriculture, to determine their winter hardiness. Those which have appeared most promising from the standpoint of winter hardiness, as well as two commonly grown strains of Kharkov, are now being tested for yield as well as hardiness in duplicate one-fortieth-acre plots, and their yields will be reported when an average for a few years is obtained.

OATS

There were eleven varieties of oats grown for comparative purposes on $\frac{1}{40}$-acre plots and these were all seeded on April 8. The rate of seeding in the case of all varieties excepting Laurel was sixty-eight pounds per acre. Laurel, being a hulless variety, was seeded at sixty 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. 2	116	28	10	48·82	68·04	104·10
Gold Rain	Aug. 2	116	30	10	51·18	68·01	104·05
Scottish	Aug. 2	116	30	10	48·24	67·15	102·74
Longfellow Ottawa 478	July 26	109	29	10	38·24	66·65	101·97
Victory	Aug. 4	118	32	10	48·24	65·95	100·90
Banner Ottawa 49	Aug. 2	116	28	10	50·00	65·36	100·00
Gerlach	Aug. 2	116	26	10	44·71	60·98	93·30
Leader	Aug. 2	116	32	10	42·65	59·97	91·75
Danish Island	Aug. 4	118	30	10	45·29	58·48	89·47
O. A. C. 3	July 23	106	25	10	39·41	56·38	86·26
Laurel Ottawa 474	July 26	109	30	10	32·94	44·53	68·13

The table shows the average results of the varieties tested for the past three years, and their yield in per cent of the yield obtained from Banner Ottawa 49. Markton, a variety imported from Montana has been found the highest yielder for the three-year period. Gold Rain has also been one of the best yielding varieties. The name Scottish was given to an unnamed sample of oats received from Scotland a few years ago. It also has been giving good results. Victory and Banner are the two most popular varieties in the district and have not been outyielded sufficiently as yet to warrant being replaced by newer sorts. Laurel is the best variety of oats of the hulless type tested to date. While it yields considerably lower than other varieties of oats tested its feed value is much higher.

BARLEY

Ten varieties of barley were included in the variety tests. Seeding of all of these was done on April 8, the rate of seeding being seventy-two pounds per acre, excepting in the case of two hulless varieties, Himalayan and Junior, in which case the rate was sixty pounds per acre.

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	July 26	108	28	10	35·42	56·66	151·13
Horn	July 30	112	29	10	36·67	48·55	129·50
Hannchen	Aug. 2	115	25	10	32·92	48·35	128·97
Cape	July 20	102	25	10	27·08	47·69	127·21
Bearer Ottawa 475	July 30	112	29	10	34·58	44·54	118·81
Gold	Aug. 2	115	20	10	26·25	42·43	113·18
Himalayan Ottawa 59	July 19	101	20	10	22·08	38·84	103·60
O. A. C. 21	July 28	110	30	10	27·08	37·49	100·00
Junior Ottawa 471	July 19	101	18	10	23·13	37·43	99·84
Canadian Thorpe	July 30	112	26	10	28·33	36·50	97·36

Trebi has been a consistently high-yielding variety during the past few seasons, and it has outyielded Horn, the next highest for the three-year period,

by eight bushels per acre. However, the fact that the past few seasons have been wetter than usual may have partly accounted for this as Trebi responds particularly well to irrigation. Horn, a two-rowed barley, was found a good yielding variety for the three years in which it has been tested, and on account of being much thinner in the hull than Trebi it is considered a better feed barley. Hannchen is also one of the best barleys of the two-rowed type. Himalayan Ottawa 59 and Junior Ottawa 471 are two of the best varieties of the hulless type which have been tested. O.A.C. 21 was the most commonly grown variety in the district until recent years, but it is gradually being supplanted by others which have a higher yielding capacity.

FIELD BEANS

A number of varieties of field beans are tested each year under dry land conditions in rod row plots. The rows are spaced twenty-two inches apart and the tests are conducted in quadruplicate. Seeding is done by hand, at a rate of approximately sixty pounds per acre.

Eleven varieties were tested in the past season. These were all seeded on May 15 and the harvesting period extended from September 2, in the case of the earliest ripening variety, to September 11 in the case of the latest.

The following table shows the average results obtained from tests conducted in past seasons, and the varieties tested are arranged in their order of yield.

FIELD BEANS—TEST OF VARIETIES (DRY LAND)

(Grown in Rod Row Plots Replicated Seven Times)

Variety	Number of days to mature	Colour and size of beans		Susceptibility to		Yield per acre					
				Anthracnose	Blight	1925	1926	1928	1929	1930	Average
						bush.	bush.	bush.	bush.	bush.	bush.
Luther Burbank	113	White	Small	None	None	13·54	23·10	3·19	18·12	8·73	13·34
Great Northern	119	White	Large	None	None	9·42	10·70	4·79	22·92	13·34	12·24
Robust	117	White	Small	None	None	10·99	16·10	3·50	19·09	9·15	11·77
Australian Brown	113	Brown	Large	None	Trace	13·96	12·30	5·25	18·32	7·83	11·53
Imperial Pea Bean	117	White	Small	None	None	11·93	13·10	3·72	15·21	9·10	10·62
Meyer	116	White	Small	None	Trace	10·00	12·10	4·16	17·88	8·50	10·53
Large White	115	White	Large	None	Considerable.	9·06	6·90	3·82	18·97	7·54	9·26
Navy	118	White	Large	None	None	7·55	11·30	4·92	17·69	4·61	9·21
Beauty	117	White and Brown	Medium	None	Considerable	9·70	8·80	3·30	15·31	8·38	9·10
Yellow Six Weeks	113	Yellow	Large	None	None	8·34	12·60	3·39	13·28	6·81	8·88
Lady Washington	116	White	Small	None	None	3·86	12·40	3·38	17·16	7·19	8·80

The Luther Burbank variety has the highest average yield for the five year period, and when other characteristics are considered also, it appears to be the variety most worthy of recommendation at the present time. Great Northern is the variety most commonly grown in Montana but has been found to be too late in maturing at the Lethbridge station. The Robust variety is another desirable one of the small white type. Australian Brown, or as it is often called now Alberta Brown, is one of the best coloured varieties.

IRRIGATED LAND

VARIETY TESTS

Variety tests of grain on irrigated land are conducted only in rod-row plots. All seeding is now done with a hand seeder and threshing is done with a small machine devised for threshing small plots. The land on which the tests were conducted was in peas the previous year and is in a three year rotation of corn, peas and grain. The rates of seeding were ninety pounds per acre for wheat, eighty-five for oats, and ninety-six for barley.

All varieties were given one irrigation on June 11 which provided them with ample moisture for the season. The warm weather which followed produced a rapid growth and high yields. The freedom from early fall frosts and storms resulted in the quality of grain produced on irrigated land being of a higher standard than usual.

AVERAGE RESULTS FOR PAST FOUR-YEAR PERIOD OF VARIETIES OF WHEAT

Tested in Rod-Row Plots. (Irrigated Land)

Variety	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.
White Federation No. 4981	119	41	9·9	63·75	69·4
Supreme	121	46	8·9	62·75	66·0
Early Triumph	118	46	9·2	63·50	64·0
Hard Federation No. 71	120	41	9·9	64·5	62·5
Ceres	122	47	7·2	62·5	61·7
Red Quality A	118	45	8·2	64·1	60·2
Hard Federation No. 31	119	40	9·6	63·9	60·0
Red Bobs No. 222	119	47	9·3	63·9	59·6
Reliance	125	48	5·6	64·25	59·4
Marquis Ottawa 15	123	47	7·6	63·25	58·9
Hard Federation No. 4733	121	38	9·7	62·6	58·1
Marquis 10 B	123	47	6·9	63·1	57·7
Early Red Fife, Ottawa 16	127	50	7·2	64·4	57·5
Renfrew	124	50	6·7	62·6	56·9
Kitchener	127	51	6·7	63·75	56·0
929 B	117	43	8·1	64·9	54·4
Quality	118	45	9·5	64·25	53·8
928 QQ2	117	43	8·8	63·6	51·7
Hard Federation No. 4734	126	42	8·6	60·75	51·5
Reward Ottawa 928	115	45	9·3	65·0	51·2
Segalstad	124	48	4·8	62·1	50·8
Garnet Ottawa 652	112	42	8·8	63·5	47·6
Ruby Ottawa 623	113	42	8·9	64·4	47·5
928 P	114	42	9·6	63·1	45·6
Red Fife Ottawa 17	127	50	6·8	62·25	45·3

The table shows White Federation No. 4981 to be the highest yielding variety over the four year period. The Federation strains are tested mostly to determine the possibilities of developing new varieties by crossing them with some that are in common use at present. Being white in colour they are undesirable wheats for the Canadian prairies. Supreme, Early Triumph and Red Bobs 222, three selections from Red Bobs, have been found three of the highest yielding varieties on the irrigated farm. While these are not recommended in preference to Marquis they are probably the varieties which are most likely to give satisfaction in this part of the Province where it is decided to substitute another variety for Marquis. Renfrew is very similar to Marquis in appearance, the chief difference being that it is slightly longer in the straw. It also has been giving good results but at present there seems to be no justification for recommending it in preference to Marquis. Reward and Garnet are grown in the district to some extent but are important only for their earliness. On much of the irrigated land it is often found necessary to delay seeding as long as possible in order to kill one or two crops of wild oats before seeding, and under such circumstances early varieties such as the two mentioned can be used to good advantage. It should always be remembered, however, that their yielding capacity here is considerably lower than that of Marquis.

AVERAGE RESULTS FOR PAST FOUR-YEAR PERIOD OF VARIETIES OF OATS

Tested in Rod-Row Plots. (Irrigated Land)

Variety	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	119	51	4·6	32·9	91·9
Richland	108	39	7·2	34·9	90·1
O. A. C. 144	119	54	5·4	34·3	89·3
Kherson	109	45	6·8	33·8	85·80
Gerlach	116	52	5·1	35·1	85·8
Markton	120	48	5·1	37·0	85·3
Danish Island	118	53	5·5	32·5	84·8
Legacy Ottawa 678	113	47	7·0	34·4	82·3
Banner Ottawa 49	117	52	5·7	34·5	81·9
Longfellow Ottawa 478	113	53	6·3	37·0	81·80
O. A. C. 3	110	45	7·5	34·1	77·8
White Cross	109	49	7·3	33·6	74·2
Laurel Ottawa 474	111	47	8·1	50·5	69·8
Gold Rain	114	54	6·7	35·9	68·4
Victory	118	50	6·0	37·6	68·4
Cole	107	43	8·0	34·1	67·3
Alaska	106	46	8·8	37·4	66·7

Banner has in the past been looked upon as the best variety of oats for irrigated land. It has been outyielded at the station in recent years by several other varieties, most of which are comparatively new ones and which, therefore, should not be definitely recommended as yet. Laurel Ottawa 474 is a hulless variety and the best one tested thus far of its kind.

AVERAGE RESULTS FOR PAST FOUR-YEAR PERIOD OF VARIETIES OF BARLEY

Tested in Rod-Row Plots. (Irrigated Land)

Variety	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.
Trebi	108	35	5·3	48·0	81·60
Horn	111	41	4·7	54·1	76·29
Velvet	106	45	6·5	51·0	75·82
O. A. C. 21	103	47	5·9	52·0	75·53
Hannchen	110	42	5·2	53·6	75·36
Canadian Thorpe	109	44	6·8	52·5	74·24
O. A. C. 21 Sask. Sel	105	44	5·6	51·0	72·87
Bearer, Ottawa 475	111	45	5·0	48·0	69·93
Cape	106	38	4·6	46·0	68·96
Bark's	111	39	5·6	44·25	68·08
Himalayan, Ottawa 59	105	34	5·6	62·1	66·95
Smith's	114	45	4·9	51·6	62·21
Star	103	39	6·5	50·1	61·55
Duckbill, Ottawa 57	110	44	7·2	53·0	61·25
Junior, Ottawa 471	104	34	6·1	58·9	57·74

Trebi is a consistently high yielding variety on irrigated land and is the one recommended where grown for feed purposes under such conditions. Horn has also given high yields, and on account of being very thin in the hull is an excellent variety for feeding purposes. Where barley is grown for malting purposes the O.A.C. 21 variety should be chosen as it is the one preferred by the maltsters.

FLAX

The folowing varieties of flax were tested in quadruplicate rod row plots on irrigated land:—Linota, Reserve, Newland, Redwing, Crown, N.D. No. 114, Bison. When these have been tested for a few years longer the average results for the period will be given.

The first three varieties mentioned were tested also in duplicate plots one sixty-fifth acre in size. The yields obtained are given below, but it should be remembered that they are for one year's results only, and therefore cannot be looked upon as conclusive.

Reserve—39·9 bushels per acre.
Linota—38·6 bushels per acre.
Newland—35·0 bushels per acre.

FLAX AND WHEAT MIXTURES

A few combinations of flax and wheat were grown to determine the best mixture to use of these two grains when seeding them together, and also to determine whether or not the returns from them when grown in combination will exceed those received from either crop grown singly.

The cash prices offered by the local elevator for wheat and flax formed the basis for computing the returns from the different plots.

WHEAT AND FLAX MIXTURES—(Irrigated Land)

Rates of seeding—pounds per acre	Yield per acre wheat	Yield per acre flax	Returns per acre wheat value $0.50 flax value $1.03
	bush.	bush.	$
Wheat, 90	35·2	.....	$17 61
Flax, 42	.....	39·9	41 10
Wheat, 30—flax, 14	56·1	3·3	31 40
Wheat, 45—flax, 14	58·4	2·5	31 82
Wheat, 30—flax, 28	48·3	3·7	27 89
Wheat, 45—flax, 28	58·1	3·5	32 60
Wheat, 30—flax, 42	50·1	5·2	30 35
Wheat, 45—flax, 42	55·4	5·5	33 37

The figures given in the table are for only one year's trial and therefore cannot be looked upon as final. The flax alone proved considerably more profitable than the wheat alone, or any of the combinations. Difficulty is very often experienced in cutting flax with a binder but no difficulty whatever was experienced in cutting any of the mixtures.

FIELD PEAS

For the last four years six varieties of field peas have been grown for comparative purposes in quadruplicate plots consisting of fifteen rows one rod in length and seven inches apart. Seeding has been done by hand at the rate of approximately three bushels per acre, excepting in the case of Golden Vine and Chancellor where the rate was reduced to two bushels on account of the seed being so much smaller in size. It has not been feasible to remove the outside rows to eliminate the border effect, consequently the yields are somewhat higher than would be obtained under normal field conditions.

One irrigation was given on June 12.

FIELD PEAS—TEST OF VARIETIES (IRRIGATED LAND)

Variety	Number of days maturing	Colour of flowers	Yield per acre				
			1927	1928	1929	1930	Average
			bush.	bush.	bush.	bush.	bush.
Prussian Blue	135·9	White	52·94	56·96	67·90	69·85	61·91
Mackay, Ottawa 25	136·7	White	40·49	48·61	65·50	65·85	55·11
O. A. C. 181	134·75	White	41·02	55·37	54·90	61·10	53·10
Chancellor, Ottawa 26	135·1	White	40·49	49·70	55·40	49·30	48·72
Arthur, Ottawa 18	134·1	White	38·81	44·85	46·30	49·33	44·82
Golden Vine	140·0	White	16·62	26·70	48·80	52·45	36·14

Prussian Blue has been a consistently high yielding variety, but on account of its blue colour other varieties are often preferred to it. Mackay Ottawa 25 is recommended where discrimination is made against seed which is coloured. Chancellor and Golden Vine each have seed which is small in size and generally very uniform, making them suitable varieties varieties for exhibition purposes.

CANNING PEAS

A number of peas suitable for canning purposes are tested in the same way as that outlined for field peas. When these have been under test for a sufficient number of seasons their average yields will be reported.

FIELD BEANS

On account of the first killing frost of the fall not occurring until approximately one month later than usual the season was particularly favourable for field beans. Even the latest ripening varieties matured successfully and farmers who had any land devoted to this crop harvested big yields and became enthused over the apparent possibilities for deriving good returns from them annually. The market demand is for beans of the small white type. These require a slightly longer season than coloured beans, and the damage from early fall frosts is the greatest obstacle to contend with in the growing of them.

Tests are conducted annually with about a dozen different varieties of field beans. These are seeded by hand in order to obtain the desired rate of seeding in all cases. The ordinary sugar beet drill is recommended where any considerable acreage is seeded. Special bean plates can be procured for such drills to seed at the rate desired. The rows are spaced twenty-two inches apart and cultivating can be done then with the sugar beet cultivator. Each variety test is replicated nine times, making ten plots in all. The plots are one rod in length and twenty-two inches apart. Yields are determined by averaging the results obtained from the ten plots of the different varieties.

In the past season thirteen varieties were grown for comparative purposes. These were all seeded on May 14, and the harvesting period extended from September 1 in the case of the earliest ripening variety to September 10 in the case of the latest. The rate of seeding was approximately seventy-five pounds per acre for beans of the small type, and this rate was increased for the larger varieties in proportion to the size of seed.

FIELD BEANS. TEST OF VARIETIES (IRRIGATED (LAND)

(Grown in Rod Row Plots Replicated Seven Times.)

Variety	Number of days matur'g	Colour and size of beans		Susceptibility to		Yield per acre				
				Anthracnose	Blight	1925	1926	1929	1930	Average
						bush.	bush.	bush.	bush.	bush.
Great Northern	119	White	Large	None	Trace	36·00	31·60	48·25	93·00	52·21
Luther Burbank	114	White	Small	None	None	46·10	45·40	33·60	56·67	45·45
Australian Brown	111	Brown	Large	None	Considerable	43·86	32·30	36·45	56·28	42·22
Imperial Pea Bean	115	White	Small	None	None	38·75	38·70	32·18	58·07	41·92
Robust Pea Bean	115	White	Small	Considerable	None	30·47	30·60	39·15	64·23	41·11
Lady Washington	118	White	Small	None	Trace	33·33	34·90	36·60	58·97	40·95
Yellow Six Week	112	Yellow	Large	None	Trace	32·50	31·50	34·05	59·09	39·29
Michigan Early Wonder	115	White	Small	Bad	None	35·57	42·90	29·03	46·93	38·61
Kotenashi	114	White	Small	Considerable	None	27·29	39·70	31·65	53·68	38·08
Navy	119	White	Large	None	Trace	20·37	37·20	31·73	62·00	37·82
Meyer	114	White	Small	None	Considerable	21·25	37·00	27·98	58·85	36·27
Beauty	110	White and brown.	Medium	Bad	Bad	28·54	32·40	34·89	30·24	31·52
Large White	112	White	Large	None	Very bad	21·67	30·60	29·48	38·70	30·11

The preceding table includes the varieties for which average results can be obtained for four different seasons, and these varieties are arranged in their order of yield for that period. The seasons 1927 and 1928 were not included as a few of these varieties were not under test in those particular seasons. If it had been possible to include them the average yields of all varieties would have been much lower, as both frost and early snows caused heavy losses in both seasons.

The Great Northern variety is included for comparison because it is the one most commonly grown in Montana. While it heads the list in yield for the four year period it cannot be recommended for Southern Alberta conditions, since it is the latest ripening variety under test and too often suffers severe damage from frost. Its extremely high yield in this season, which was so much more favourable than usual for beans, was largely responsible for its outyielding all others for the period. Luther Burbank, which is of desirable size and colour, and as early as any other of the small white type, as well as a good yielder, appears at present to be the one most worthy of recommendation. Australian Brown, or as it is sometimes called Alberta Brown, and Yellow Six Weeks are two of the best coloured varieties. The Robust Pea Bean and Lady Washington are also two good small white varieties, although the latter is somewhat late in maturing. Kotenashi is the variety which is imported from Japan to supply the Alberta markets. Beauty is a desirable variety in many respects, but is usually so badly affected by disease that the yield is low.

FORAGE CROPS

The spring season was favourable for the germination of seed of different classes of forage crops. Timely rains eliminated the difficulty so often experienced in getting grass and clover crops established, especially in the drier areas. They also produced a heavy growth of weeds, however, which required frequent cultivating to keep them under control. The warm weather of the summer season produced a rapid and heavy growth of all forage crops on irrigated land, but on dry land crops began to suffer from a lack of moisture about the middle of July, and the amount of growth produced from then on was decreased appreciably. One irrigation was found sufficient for all hoed crops excepting a few cases where it was applied a second time to sugar beets.

On account of the first killing fall frost not occurring until October 15, about one month later than usual, corn, where it was allowed to mature as fully as possible before cutting, produced much better seed than is ordinarily

grown in the district. The first frost of the autumn was a severe one and did a great deal of damage to hoed crops which were then being harvested, particularly potatoes and sugar beets. Nearly all potato crops that were not dug before October 15 were ruined by frost, and sugar beets that were delivered to the sugar factory after that date were reduced in value by one dollar per ton.

TESTS CONDUCTED ON DRY LAND

CORN

A number of corn varieties are tested each year for ensilage purposes. These are always seeded on summer-fallowed ground with an ordinary two-row corn planter, at the rate of approximately twenty pounds per acre, and in rows three feet apart. All varieties are grown in quadruplicate 1/200-acre plots. As soon as the plants are sufficiently high they are thinned to ten inches apart in the row. In harvesting the yield of green matter is determined by weighing the crop from the entire plot, and the yield of dry matter is determined by running about ten pounds of green material from the plot through an ordinary cutting box and drying in an oven a two-pound sample of this cut material and determining the loss in weight, which represents the amount of moisture contained. From the weight of the residue the per cent of dry matter in the sample can be determined and likewise the yield per acre of dry matter for the variety.

There were twelve varieties under test in 1930 and each one of these was included in the tests for the past three seasons. They were all seeded on May 7 and harvested on September 12 and 13.

The following table shows the results obtained this season and also the average results for the last three seasons. The table includes the maturity at harvest of each variety and attention is called to the foot-note concerning this.

CORN—TEST OF VARIETIES (DRY LAND)

Variety	Source	Height of plant at harvest		Maturity at harvest	Rate of yield per acre green weight		Rate of yield per acre dry matter		Per cent dry matter	Average yield dry matter for past three years	
		ft.	in.		tons	lb.	tons	lb.		tons	lb.
White Flint	Northland Seed Co., Sydney, Montana	4	10	Dough	6	400	2	860	39·19	2	130
North Western Dent	Disco	5	4	Dough	9	1,875	2	1,342	26·88	2	72
Pride Yellow Dent	Disco	5	11	Dough	12	350	2	1,280	21·63	2	38
Minn. No. 13 (Haney Strain)	O. Will	5	4	Dough	10	1,925	3	193	28·25	1	1,982
Twitchell's Pride	Fredericton	4	6	25 p.c. ripe	4	1,325	1	1,780	40·54	1	1,733
Longfellow	J. O. Duke	6	–	Milk	11	1,725	2	364	18·30	1	1,727
Gehu	Disco	4	5	5 p.c. ripe	4	1,700	1	1,899	40·19	1	1,674
North Western Dent	Lethbridge Ex. Station	4	10	Almost ripe	6	1,800	2	432	32·12	1	1,420
Burr Leaming	Carter	5	5	Early milk	9	825	1	1,652	19·40	1	1,374
Quebec No. 28	Macdonald College, Que.	4	2	45 p.c. ripe	4	850	1	1,865	43·67	1	1,293
North Western Dent	Brandon Ex. Station	4	2	Almost ripe	7	1,050	2	94	27·20	1	1,276
Manitoba Flint	Man. Agric. College	3	8	Ripe	2	1,625	1	330	50·31	1	538

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 is implied in speaking of ripe corn in a district where corn is commonly grown for grain.

A few of the varieties in the table are better adapted for grain or hogging-off than for ensilage purposes. Those of this class are White Flint, Twitchell's Pride, Quebec No. 28, Gehu and Manitoba Flint.

Good varieties of ensilage corn should not only produce a heavy yield, but should also reach a fair degree of maturity, in order that the ensilage produced should be of good quality. A few of the best varieties of this class are the early strains of Northwestern Dent and Minnesota No. 13 (Haney Strain).

TESTS CONDUCTED ON IRRIGATED LAND

CORN

There were seventeen varieties of corn tested and these same varieties were under test the two previous seasons. The method of testing is explained under the dry land section of the report pertaining to corn variety tests. Seeding was done on May 5, on land on which grain had grown the year previous. All varieties here harvested from September 18 to 20 inclusive. One irrigation was given on August 2. The table shows the yields obtained this season and also the average yield in dry matter for the three-year period. The degree of maturity attained is also included and attention is drawn to the foot-note concerning this point.

CORN—TEST OF VARIETIES (Irrigated Land)

Variety	Source	Height of plant at harvest		Maturity at harvest	Rate of yield per acre green weight		Rate of yield per acre dry matter		Per cent dry matter	Average yield dry matter for past three years	
		ft.	in.		tons	lb.	tons	lb.		tons	lb.
White Flint	Northland Seed Co., Sydney, Montana	4	9	Almost ripe	20	950	6	160	29·70	5	858
Gehu	Disco	4	8	50 p.c. ripe	17	1,650	4	1,821	27·55	5	424
North Western Dent	Disco	5	9	Late dent	23	350	5	1,248	24·27	5	253
Twitchell's Pride	Fredericton	5	–	Glazed	17	1,650	5	239	28·72	4	1,560
Mercer	Northrup King	7	3	Milk	24	600	4	774	18·05	4	1,448
North Western Dent	Crookston Strain	6	2	Late dent	17	1,300	5	866	30·78	4	1,348
Wisconsin No. 7	O. Will	8	2	Milk	29	1,650	5	1,582	19·42	4	1,335
Minn. No. 13 (Haney Strain)	O. Will	6	4	Dent	19	1,300	5	1,023	28·05	4	1,268
Pride Yellow Dent	Disco	7	4	Dent	23	550	5	238	21·99	4	980
Quebec, No. 28	Macdonald College, Que.	4	10	Glazed	16	1,800	3	1,808	23·10	4	924
North Western Dent	Lothbridge Ex. Station	5	6	Almost ripe	12	1,650	4	980	35·01	4	386
Longfellow	J. O. Duke	8	1	Milk	25	700	4	1,322	18·39	4	274
North Western Dent	O. Will	5	10	Dent	20	150	4	519	21·22	4	76
Burr Leaming	Carter	8	10	Ears formed	25	1,650	4	1,442	18·28	4	2
North Western Dent	Brandon Ex. Station	5	5	Late dent	13	950	4	388	31·12	3	1,566
Brown Co. Dent	Northland Seed Co., Sydney, Montana	5	9	Late dent	13	1,900	4	379	30·03	3	1,436
Falconer	O. Will	4	6	Dough	10	750	3	630	31·95	3	1,166

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 is implied in speaking of ripe corn in a district where corn is commonly grown for grain.

The two varieties at the top of the list in the table each reached a high degree of maturity by the time of harvesting and have produced the highest yield of dry matter for the three-year period. They are best suited for grain or hogging-off purposes but cannot always be relied upon to reach such a high degree of maturity. Twitchell's Pride is another good variety of the same type. Of the varieties of the strictly ensilage type the early strains of Northwestern Dent, and the Haney strain of Minnesota No. 13 seem to be most desirable. These produce a reasonably high yield and in practically all seasons can be relied upon to reach a sufficiently high degree of maturity to produce ensilage of good quality. Wisconsin No. 7, Longfellow and Burr Leaming are the three latest varieties under test, and while they produce a high yield of green matter, as indicated from this season's results, the quality of the ensilage produced from them is decidedly inferior to that produced by the earlier ripening varieties.

In order that the corn binder may harvest the crop satisfactorily it is important that the variety used have the ears well above the ground. Varieties, therefore, such as White Flint, Gehu, and the others mentioned as being suitable for hogging-off purposes should not be chosen as ensilage varieties.

DATES OF SEEDING CORN FOR ENSILAGE PURPOSES

A project on dates of seeding of corn for ensilage purposes is being conducted and will be reported upon in a later report when average results for a

few seasons can be given. The strain of Northwestern Dent developed at this Station is being used, and seeding is done in quadruplicate 1/200-acre plots, commencing as early as possible in April and then on the 10th, 20th and 30th of each month up till June 10.

SUNFLOWERS

While sunflowers are not recommended as a form of ensilage in the greater part of the district there may be some localities where the short season makes corn growing too hazardous, and under such conditions sunflowers may be of value. Four varieties have been tested in recent years along with corn varieties, the seeding being done at the same time and in the same way. The following table shows the results obtained from these tests for this season and for the past three seasons:—

SUNFLOWERS—TEST OF VARIETIES (Irrigated land)

Variety	Source	Height of plant at harvest		Maturity at harvest	Rate of yield per acre green weight		Rate of yield per acre dry matter		Per cent dry matter	Average yield dry matter for past three years	
		ft.	in.		tons	lb.	tons	lb.		tons	lb.
Mammoth Russian	Macdonald College, Que.	10	3	Almost ripe	46	600	7	114	15·24	7	89
Ottawa No. 76	C.E.F. Ottawa	6	11	Almost ripe	22	575	3	1,266	16·30	4	337
Mennonite	Rosthern, Sask.	4	–	Ripe	5	475	–	1,877	17·92	1	1,610
Giant Russian	McKenzie	7	5	Almost ripe	29	1,950	5	388	17·33	–	–

The Mammoth Russian variety is much the tallest and heaviest yielding variety of the four. The Giant Russian is very similar to it in type of growth and time of maturing. The Ottawa No. 76 variety does not grow so tall and produces a somewhat lower yield. The variety termed Mennonite, obtained from the Dominion Experimental Station at Rosthern, Sask., is decidedly earlier than the others but produces only a small yield.

PRODUCTION OF SEED CORN

For the past eight seasons Northwestern Dent has been grown for ensilage purposes in a rotation on irrigated land. The corn plot has been examined carefully each fall before harvesting, and the best ears have been selected for seed purposes the following year. In selecting ears for seed earliness was looked upon as the most important factor, but due consideration was also given to other points of importance, such as height of ear, attachment of ear to stalk, absence of suckers, and height of plant. Just previous to shelling, the ears were graded and the seed from those of the most desirable type was used for a special seed plot the following year. After eight years of continuous selection a marked improvement has been attained in the strain of Northwestern Dent used, both as to earliness and habit of growth. In the past season sufficient well matured ears were selected from approximately one and a half acres to give twelve hundred pounds of shelled corn, while there was still a considerable number of ears left on the plot.

A plot of irrigated land of approximately seven-tenths of an acre was seeded to Manalta corn on May 27, for seed production. By September 10 the ears were well ripened and were then picked and stored inside for drying. They were shelled in the early spring and it was found that the plot yielded at the rate of twenty-five bushels of shelled corn per acre.

FIELD ROOTS

Comparative tests are conducted annually with varieties of sugar beets, mangels, swede turnips and carrots. The seeding of these was done with an ordinary

beet drill on land that was in grain the previous season. Irrigating is generally done about the middle of July and harvesting early in October. From the average results obtained in the past few years the following appear to be the varieties most worthy of recomendation. Mangels—Yellow Intermediate, Mammoth Long Red, Golden Tankard; Swedes—Magnum Bonum, Canadian Gem, Bangholm; Carrots—Danish Champion, Large White Belgian, Long Red Surrey.

DATES OF SEEDING OF SUGAR BEETS

For the past three seasons an experiment has been conducted in the seeding of sugar beets at different dates to determine not only the best date on which to seed sugar beets, but also how late re-seeding can be practised and a profitable crop obtained. Seeding has been done at intervals of ten days, the first one being as early as April 10, when seasonal conditions permitted, and the last one on June 10. The following table shows the yields obtained from plots seeded on these dates.

DATES OF SEEDINGS OF SUGAR BEETS (IRRIGATED LAND)

Year	Rate of yield per acre, 1st date of seeding (April 10)	Rate of yield per acre, 2nd date of seeding (April 20)	Rate of yield per acre, 3rd date of seeding (April 30)	Rate of yield per acre, 4th date of seeding (May 10)	Rate of yield per acre, 5th date of seeding (May 20)	Rate of yield per acre, 6th date of seeding (May 30)	Rate of yield per acre, 7th date of seeding (June 10)
	tons lb.	tons lb.	tons lb.	tons lb.	tons lb.	tons lb.	tons lb.
1927	.....	14 1,520	13 140	18 1,180	13 1,780	13 1,020	11 1,060
1929	30 240	25 1,360	24 1,740	25 400	21 200	15 1,200	12 500
1930	.....	29 1,940	26 1,630	27 1,800	26 280	18 190	15 1,930
Average	.....	23 1,107	21 1,170	23 1,790	20 750	15 1,470	13 500

FLESHY ANNUALS

A few of the more promising varieties of fleshy annual crops have been under test in small plots for the past two seasons, to determine their value as summer and fall pasture crops. The seeding of these was done about the first of May with an ordinary beet drill, spacing the rows twenty-two inches apart. Sand was mixed with the seed in order to avoid too thick a seeding, and shortly after the plants had emerged they were thinned to four inches apart in the row. The following table shows the average yields of these crops for the past two seasons:—

FLESHY ANNUAL CROPS (IRRIGATED LAND)

Variety	Source	Rate of yield per acre green weight	Rate of yield per acre dry matter	Per cent dry matter	Average yield per acre, green weight for past two years	Average yield pre acre, dry matter for past two years
		tons lb.	tons lb.		tons lb.	tons lb.
Green Stemmed Marrow Kale	Sutton	31 1,825	4 520	13·35	34 623	4 1,637
1000 Headed Kale	Sutton	27 250	4 251	15·21	32 1,168	4 1,455
Purple Stemmed Marrow Kale	Sutton	25 1,450	3 561	12·75	32 1,833	4 1,149
Improved 1000 Headed Kale	Sutton	25 825	3 1,512	14·78	28 1,193	4 890
Giant Sutton Rape	Sutton	26 600	3 738	12·81	28 1,614	3 1,771
Sheep Kale	Sutton	15 700	2 119	13·42	19 1,910	2 1,999
Giant Drumhead Cabbage	Sutton	18 475	2 340	11·90	— —	— —

SOY BEANS

A number of varieties of soy beans have been tested for the past three seasons to determine their value as a forage crop for the district. The tests in each season indicated that soy beans is a crop which requires a longer growing season than that of the Lethbridge district in order to be classed as a crop which can be recommended. Only one variety, Early Black, became sufficiently far advanced to produce a fair amount of ripe seed.

ALFALFA AND CLOVER SEED PRODUCTION

Alfalfa produces seed in a very erratic manner in Southern Alberta. In some seasons a very good crop is to be had, while in others no seed, or practically none, is produced. The summer of 1930 proved favourable to the setting of the seed and consequently the production of alfalfa seed in the district was greatly increased over that of former years.

CLOVER.—Two plots approximately one acre in size, were seeded in the spring of 1927 to Alta swede and Alsike clover. A fair stand was obtained but the extremely adverse weather conditions in the fall of 1928 made the crops practically a total failure for seed production that season. The yields for the next two years were as follows: Alta swede, 1929—251·3 pounds per acre, 1930—108 pounds per acre; Alsike, 1929—249 pounds per acre, 1930—179 pounds per acre.

FIELD HUSBANDRY*

DRY LAND CULTURAL EXPERIMENTS

Cultural experiments on the dry land included comparisons on both drifted and undrifted soils, of (1) ploughed and ploughless summer-fallow, (2) wheat following wheat on spring ploughing, and on land that was disked and cultivated without ploughing after the stubble had been burned and (3) two years' wheat following sweet clover ploughed under as green manure and following sweet clover cut for hay.

This set of plots was established in 1928 so only two years' crop data are available, but so far there is little difference observable in the crops on ploughed and ploughless summer-fallow and on spring ploughed stubble as compared to land where the stubble was burned and the field was then disked and cultivated. Land that had six to eight inches of the surface soil blown off in 1926 produced a crop much more nearly equal to the crop on undrifted land in 1930 than in 1929. This improvement was more noticeable on the plots that were in sweet clover the preceding year than on any of the other plots.

Cutting the sweet clover for hay and then ploughing seemed as effective in bringing the drifted land back to production as ploughing the entire plants under for green manure.

DRY LAND CROP ROTATIONS

Six dry land rotations, with plot areas of one acre or more, that have been established for nineteen years furnish some interesting comparisons, as some of these have legume crops and receive an application of twelve tons of manure per acre once in the rotation cycle, while others produce grain only without fertilizer of any kind. Rotation "B" alternates wheat and summer-fallow, and rotation "C" is a three years' rotation of summer-fallow, wheat and wheat. Neither of these two receive any fertilization. Rotation "S", that has a field of peas and oats and receives twelve tons of manure per acre once in its cycle of nine years, contains a field of spring wheat following summer-fallow that can be compared to the wheat after summer-fallow on rotations "B" and "C." The

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

nineteen years' average yield of this field on "S" was but 0·11 bushel more than the similar field on "B", and 0·72 bushel more than "C." The yield this year is over eight bushels more on "S" than on either of the other two, but this is apparently a seasonal fluctuation and not due to accumulative residual influence of the legume or fertilizer as the yields of the similar wheat plots in 1929 were greater on both "B" and "C" than on "S". If there was any beneficial effect from the legume or barnyard manure, it did not appear to have any influence five years after application on the wheat on rotation "S".

Rotations "J" and "Z", established for nine years, contain a more direct comparison of the effects of a legume on a succeeding wheat crop. Both of these rotations have a spring wheat crop following a summer-fallow that is preceded by a legume. Alfalfa, mixed with western rye grass, is the legume on "J" and sweet clover is used on "Z". Both of these crops are cut for hay. The average yields of wheat following summer-fallow on these rotations and on rotations "B" and "C" for nine years were: "B" 31·12, "C" 29·98, "J" 28·60, and "Z" 28·50. Here the yields were slightly in favour of the non-legume rotations but not enough to be significant except that they showed no increase in yields by the use of legumes.

It is also apparent from present yields and those received when this land was first farmed that there has been no noticeable decrease in the productivity of the soils of the straight grain rotations in nineteen years.

Spring vs. Winter Wheat.—Another interesting comparison is the yields of winter wheat, following summer-fallow, on rotations "M" and "T", with that of spring wheat, following summer-fallow, on "B", "C" and "S". The nineteen years' average is just 0·42 bushel per acre more for the winter wheat than for the spring wheat. In the years when winter-killing of winter wheat was not important this crop usually yielded appreciably more than spring wheat, especially when July and early August were dry. This increase was equalized, however, by lower yields in years when winter-killing was severe. Root-rot has not been a serious factor with the winter wheat as the plots have not been seeded before the first week in September.

The possible value of winter wheat as a means of helping to control soil drifting in the winter and spring was not measurable on the relatively narrow strips formed by the plots of these rotations, as soil drifting was not important on any of the rotations. The season's labour is distributed more evenly if part of the farm is in winter wheat, danger from fall frost is almost eliminated and chances are better for successful harvesting with the combine.

A serious objection to winter wheat is that it usually sells for from five cents to ten cents less per bushel than does spring wheat of a similar grade. Winter annual weeds, especially tumbling mustard, are also a problem in winter wheat production, while wild oats and some other spring annuals seem more troublesome in spring wheat.

Crop Yield and Profit and Loss Data.—In the tables that follow a summary is given of the crop yields and the profit or loss sustained from each crop in 1930 and the average for the entire time the rotation has been established.

The labour cost data are arrived at by using a standard set of time values for each field operation, based on 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 time in which to expect to accomplish each operation with the equipment indicated.

Two important objections to the compilation of cost data of this kind are (1) that no account is taken of the possibility that one type of rotation may spread the labour over a greater period of time, making it possible to do the same amount of work with less equipment, and (2) the time values are based on the use of small units, two to five horses or a three plough tractor, and are higher

than would be necessary with large outfits. This should be kept in mind in interpreting the presented data.

The cost and return values of materials and labour are as near the prevailing average prices as could be determined at the time the data were compiled.

STANDARD TIME REQUIRED FOR FARM OPERATIONS ON DRY AND IRRIGATED LAND

Operation	Time per acre
	hours
Ploughing with one-bottom plough—	
Alfalfa sod—1 man and 5 horses	4·00
Stubble—1 man and 3 horses	4·00
Ploughing with two-bottom plough—	
Stubble—1 man and 5 horses	2·25
Ploughing with three-bottom plough—	
Stubble—1 man and tractor	1·25
Double disking—1 man and 4 horses	1·08
Cultivating—1 man and 4 horses	0·67
Float levelling irrigated land—1 man and 4 horses	1·00
Seeding—1 man and 4 horses	0·58
Harrowing—1 man and 3 horses	0·37
Cutting with binder—1 man and 4 horses	0·67
Mowing hay—1 man and 2 horses	1·00
Raking hay—1 man and 2 horses	0·58
Planting corn—1 man and 2 horses	1·25
Cultivating corn—1 man and 2 horses	2·00
Harvesting corn with corn binder—1 man and 3 horses	2·00
Stooking grain—1 man	1·25
Coiling hay—1 man	1·25
Irrigating—1 man	2·00
Hauling and stacking one ton of hay—2 men and 2 horses	1·70
Hoeing—actual time used.	
Sugar beet work at current contract prices.	

COST OF VALUES—1930

Rent and taxes, dry land	$2 50
Rent and taxes, irrigated land	8 00
Manure, per ton	1 00
Seed wheat, per bushel	1 10
Seed oats, per bushel	0 68
Seed barley, per bushel	0 96
Seed peas, per bushel	3 50
Seed rye, per bushel	1 00
Seed corn, per pound	0 06
Alfalfa seed, per pound	0 40
Rye grass seed, per pound	0 13
Sweet clover seed, per pound	0 12
Brome grass seed, per pound	0 20
Sugar beet seed, per pound	0 15
Twine, per pound	0 14
Machinery, per acre	1 35
Manual labour, per hour	0 30
Horse labour, per horse, per hour	0 08
Threshing wheat and peas, per bushel	0 10
Threshing barley, per bushel	0 08
Threshing oats, per bushel	0 07
Ensiling, per ton	1 30
Tractor for three-bottom plough, per hour	1 00

RETURN VALUES

Winter wheat, per bushel	$ 0 40
Spring wheat, per bushel	0 50
Oats, per bushel	0 25
Barley, per bushel	0 25
Rye, per bushel	0 25
Peas, per bushel	1 80
Alfalfa hay and pea and oat hay, per ton	10 00
Sweet clover hay, per ton	8 00
Alfalfa seed, per pound	0 20
Corn ensilage, per ton	3 50
Wheat or pea straw, per ton	Nil
Oat or barley straw, per ton	2 00
Sugar beets, per ton	7 00

SUMMARY OF YIELDS AND PROFITS OR LOSS PER ACRE ON DRY LAND ROTATIONS

Rotation "A"—Wheat Continuously

Rotation year	Crop	Yields		Profit or loss (−)	
		1930	Average for 19 years	1930	Average for 19 years
				$	$
1	Wheat	9·10 bush.	13·42 bush.	−7 12	4 04
	Field average per acre			−7 12	4 04

Rotation "B"—Two Years' Duration

1	Summer-fallow				
2	Wheat	28·75 bush.	27·29 bush.	−2 60	10 20
	Field average per acre			−1 30	5 10

Rotation "C"—Three Years' Duration

1	Summer-fallow				
2	Wheat	28·50 bush.	26·68 bush.	−0 43	9 57
3	Wheat	12·10 bush.	*21·34 bush.	−6 39	8 00
	Field average per acre			−2 27	5 86

*Average for 7 years. Previous average for 12 years, 38·72 bushels oats.

Rotation "S"—Nine Years' Duration

1	Summer-fallow				
2	Corn	10·46 tons	7·90 tons	1 87	−4 62
3	Winter rye	32·29 bush.	*24·30 bush.	−8 12	10 42
4	Summer-fallow				
5	Wheat	37·33 bush.	27·40 bush.	−1 09	6 50
6	Oats	33·90 bush.	42·90 bush.	−7 50	5 44
7	Summer-fallow				
8	Peas and oats	1·84 tons	2·11 tons	−6 21	−1 94
9	Wheat	26·00 bush.	27·00 bush.	−3 76	3 96
	Field average per acre			−2 76	2 19

*Average for 7 years. Previously used as pasture.

Rotation "T"—Ten Years' Duration

1	Summer-fallow				
2	Winter wheat	34·10 bush.	27·55 bush.	−2 96	6 78
3	Oats	24·10 bush.	45·96 bush.	−7 93	7 29
4	Alfalfa seeding			−10 20	−15 15
5	Alfalfa seed	59·4 pounds	36·27 pounds	−0 79	6 36
6	Alfalfa seed	21·9 pounds	27·81 pounds	−8 34	6 01
7	Alfalfa seed	30·6 pounds	20·48 pounds	−8 32	4 39
8	Summer-fallow				
9	Corn (silage)	4·55 tons	*4·74 tons	−7 42	−3 98
10	Spring wheat	24·70 bush.	24·57 bush.	−2 42	13 18
	Field average per acre			−4 84	2 51

*Average for 15 years. Previous average for 4 years, 16·44 tons turnips.

ROTATION "M"—SIX YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1930	Average for 19 years	1930	Average for 19 years
				$	$
1	Summer-fallow				
2	Winter wheat	44·70 bush.	27·53 bush.	−2 22	5 87
3	Oats	29·20 bush.	44·42 bush.	−8 25	5 94
4	Summer-fallow				
5	Peas and oats	2·04 tons	2·24 tons	−4 21	−0 04
6	Oats	45·20 bush.	50·57 bush.	−4 65	7 60
	Field average per acre			−3 22	3 23

ROTATION "J"—SIX YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1930	Average for 9 years	1930	Average for 9 years
				$	$
1	Summer-fallow				
2	Wheat	16·20 bush.	28·60 bush.	−8 60	8 35
3	Wheat	9·70 bush.	23·11 bush.	−9 47	8 75
4	Oats (rye grass and alfalfa seeded)	18·20 bush.	31·41 bush.	−6 30	3 64
5	Hay	0·54 tons	0·93 tons	−5 23	−0 78
6	Hay or pasture	0·57 tons	1·09 tons	−4 97	3 83
	Field average per acre			−5 76	3 96

ROTATION "Z"—FIVE YEARS' DURATION

1	Summer-fallow				
2	Wheat	26·50 bush.	28·50 bush.	−5 21	6 31
3	Wheat	12·20 bush.	*27·50 bush.	−9 06	4 12
4	Sweet clover seeded			−11 37	−8 67
5	Hay or pasture	1·08 tons	1·20 tons	−2 41	2 06
	Field average per acre			−5 61	0 76

*Average for 5 years. Previous average for 4 years, 21·69 bushels oats.

ROTATION "F"—THREE YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1930	Average for 4 years	1930	Average for 4 years
				$	$
1	Corn	5·73 tons	2·05 tons	1 44	−7 07
2	Wheat	17·20 bush.	24·20 bush.	−0 62	12 95
3	Sweet clover	1·18 tons	1·70 tons	0 16	3 95
	Field average per acre			0 33	3 28

CROP ROTATIONS ON IRRIGATED LAND

Two rotations on one acre plots are conducted on the irrigated farm. One, Rotation "U", was established in 1912 and the other, Rotation "X" in 1915. A number of small plot rotations were started in 1928 in connection with some manuring studies but these have not been conducted for a sufficient length of time to be reported as rotations.

Rotation "U" has six years of alfalfa and one year each of sugar beets, wheat, oats and barley, in the order named, with alfalfa seed with the barley, making it a ten year rotation. Four interesting features have been noted in this rotation.

(1) The rotation has effectively controlled weeds. The six years of alfalfa have kept Canada thistle in check, for while patches of this weed often worked into the grain from the adjoining ditches during the three years that fields were planted to grain, but few thistles were present in the second year alfalfa hay was cut, and but rarely was a thistle plant found in the third year. The alfalfa and beet crops kept other weeds in check as well, so that weeds have not been a serious problem.

One exception should be made to this statement for in late years dandelions have infested some of the alfalfa fields to a serious extent, aggravated apparently by the development of a water table that at times was within three to four feet of the surface and had undoubtedly killed many of the alfalfa plants and permitted dandelions to establish themselves. This condition accounts for some low yields of alfalfa.

(2) The yield of alfalfa is often low the first year after seeding, where a nurse crop is used, and usually does not reach full production until two years later.

(3) The production of cereal crops has been maintained at a high point, as shown by the heavy yields of grain, and during the last two years the yields have been exceptionally heavy.

(4) The wheat crop following sugar beets is produced at a low labour cost, as the beets leave the soil in excellent condition for grain with only a cultivation required in the spring to prepare the field for seeding. A clean crop and a heavy yield is secured.

Rotation "X" of fifteen years' duration has maintained good yields, except that there were a few years when the supply of irrigation water was deficient and the crops did not receive water at the proper time and consequently low yields resulted.

This rotation has also been effective in keeping Canada thistle in check and annual weeds have not been extremely troublesome, but slightly more so than in rotation "U".

SUMMARY OF YIELDS AND PROFITS OR LOSS PER ACRE ON IRRIGATED ROTATIONS

ROTATION "U"—TEN YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (—)	
		1930	Average for 19 years	1930	Average for 19 years
				$	$
1	Alfalfa	3·39 tons	2·09 tons	13 84	7 71
2	Alfalfa	2·99 tons	3·51 tons	10 95	23 17
3	Alfalfa	1·99 tons	3·78 tons	2 24	26 58
4	Alfalfa	3·00 tons	3·87 tons	10 44	28 07
5	Alfalfa	4·16 tons	4·00 tons	20 54	28 90
6	Alfalfa	2·16 tons	4·19 tons	4 23	30 32
7	Sugar beets	17·08 tons	*11·89 tons	57 93	30 49
8	Wheat	66·80 bush.	49·13 bush.	11 59	28 40
9	Oats	109·70 bush.	94·09 bush.	5 06	17 97
10	Barley	75·60 bush.	56·14 bush.	−2 82	12 08
	Field average per acre			13 40	23 37

*8 years' average for beets.

ROTATION "X"—FIFTEEN YEARS' DURATION

Rotation year	Crop	Yields		Profit or loss (−)	
		1930	Average for 16 years	1930	Average for 16 years
				$	$
1–5	Alfalfa	4·13 tons	2·77 tons	22 87	11 17
6–10	Alfalfa	2·91 tons	2·95 tons	11 78	21 76
11	Barley	57·80 bush.	43·90 bush.	−4 69	4 90
12	Corn	15·82 tons	7·61 tons	17 15	−0 50
13	Wheat	49·80 bush.	38·51 bush.	3 49	18 81
14	Oats	80·50 bush.	65·51 bush.	1 26	6 77
15	Peas	40·50 bush.	22·15 bush.	43 37	20 48
	Field average per acre			15 59	14 34

SUMMARY OF THREE YEARS' TESTS WITH COMMERCIAL FERTILIZER

For the last three years considerable interest has been manifested in the use of phosphate fertilizers on the prairies and extensive experiments have been conducted by Dominion and Provincial Government institutions and by private corporations and individuals to learn more regarding the possible value of phosphates when added to soils of the prairie farms.

This Station is one of the institutions conducting these experiments and has used triple superphosphate and other fertilizers on irrigated sugar beets, alfalfa and wheat and on dry land wheat after summer-fallow and after wheat. The following is a summary of the results of these experiments.

SUGAR BEETS—IRRIGATED

Sugar beets promise to give the greatest financial return from the use of phosphates of any crop so far included in the experiments, due to the relatively high cash value of the crop and its response to fertility factors, and it seems safe to recommend the use of phosphates on almost all of the irrigated sugar beet fields of Southern Alberta.

So far increases as great as four tons per acre have been secured at the Station, and the average last year from the application of one hundred pounds of triple superphosphate was about two tons per acre. Two tons of beets were worth more than five times the cost of the fertilizer used.

The results at the Station are similar to those obtained by numerous farmers who have used fertilizers on their sugar beets except that some have secured greater increases in yields than have been obtained at this Station. The most significant feature is that profitable increases have been secured with almost every trial.

Ammonium phosphate has given results equally as good as superphosphate but the use of potassium does not appear to be warranted on the soils where tests have been made.

ALFALFA—IRRIGATED

Fertilizer tests on alfalfa have been conducted for only one year at the Station, and triple superphosphate was the only fertilizer used. This was drilled in to a depth of about one inch in strips through an old alfalfa field at the rate of one hundred pounds per acre.

The influence of the phosphate was easily seen when driving by the field due to the ranker growth of the crop where the fertilizer was applied. The increase in yield was not as great as the appearance of the crop indicated, however, being a total of 0·58 ton per acre of cured hay from the two crops cut. If hay was worth $5 per ton in the cock, this increase would just about pay for the fertilizer and the cost of applying same.

The significant effect on the vigour of growth, however, is indicative that further trials are desirable, as is also information concerning the influence of the phosphate on alfalfa the second and third year after application.

WHEAT

Fertilizers were applied to spring wheat on both the irrigated and dry land farms of the Station.

On irrigated land, triple superphosphate was the only fertilizer used for irrigated wheat and it has been under test for two years. In 1929 the fertilizer was applied by hand and no noticeable results were secured. In 1930 the wheat and phosphate were seeded together with a combination grain and fertilizer drill and the grain tillered better and was slightly more vigorous on the fertilized plots. This increased vigour persisted throughout the year and the fertilized plots matured three days earlier and gave an average yield of 7·2 bushels more wheat than did the unfertilized plots.

Tests in 1928.—On dry land superphosphate was applied at the rates of 25, 50, 75 and 100 pounds per acre with Marquis wheat on spring ploughed oat stubble. The fertilizer was drilled in with the wheat with a combination fertilizer grain drill. This same land was seeded to wheat again without further application of fertilizer in 1929. There was no observable difference in the crop in the fertilized and unfertilized plots in either year on this field and no increase in yields from the use of the fertilizer.

Tests in 1929.—A fertilizer drill was not available and the fertilizer was seeded broadcast and harrowed in. Plots of Marquis wheat were seeded on summer-fallow. Triple superphosphate at the rate of 100 pounds per acre, ammonium sulphate at the rate of 100 pounds per acre and potassium sulphate at the rate of 75 pounds per acre were applied, also a combination of 100 pounds of each of these salts was used. In addition to these plots on summer-fallow, a test was run on spring ploughed sunflower stubble. Plots with one hundred pounds per acre of ammonium phosphate and a mixture of one hundred pounds each of triple superphosphate, ammonium sulphate and potassium sulphate were seeded. Triplicate plots were used in all cases.

All the fertilized plots, except those receiving potassium sulphate only, showed better growth than the unfertilized plots from the time five leaves appeared until the middle of July. After July 22 no difference was noticeable except on the sunflower stubble where the fertilized plots continued to have a more vigorous appearance throughout the season.

There was no significant difference in yields on the summer-fallow that could be attributed to fertilizer influence, but on the plots seeded on sunflower stubble there was an average increase of about five bushels per acre from the fertilized plots as compared to the unfertilized plots.

Tests in 1930.—The same applications as used the previous year were made on summer-fallow except that the fertilizer was drilled in with the wheat with a combination drill instead of being broadcast on the surface.

The grain that received superphosphate alone or in combination with other salts tillered more and made noticeably better growth than the grain on unfertilized plots, ripened seven days earlier and gave an average yield of 2·7 bushels of wheat more than the unfertilized plots.

The plots sown on summer-fallow in 1929 were again planted to wheat without fertilizing to test the residual effects of the fertilizers. Certain plots in this series that were not fertilized in 1929 received an application of one hundred pounds each of ammonium sulphate, potassium sulphate, superphosphate and some plots received one hundred pounds of ammonium phosphate.

The yields on the stubble land were 4·0 bushels greater where the combination of superphosphate, ammonium sulphate and potassium sulphate was used and 3·5 bushels greater when ammonium phosphate was applied in the spring with the seed than on the check plots. There was no important residual effect noticeable from the fertilizer applied the previous year.

Weed growth was not serious on any of these plots so the possible influence on weed growth of the greater tillering and increased vigour of the wheat plants was not an important factor in these experiments.

BARNYARD MANURE EXPERIMENTS—IRRIGATED

Experiments comparing various applications of barnyard manure to irrigated land have been conducted for two years only but the increases from the use of manure have been so decided on the various plot replicates that there is no hesitancy in reporting the data from the two years' work, although most experiments of this type are continued for five years or more before much importance is attached to the results.

The field where the tests were conducted was planted to timothy in 1922 and remained in that crop until broken in the fall of 1927. In 1928 the field was divided into $\frac{1}{46}$ acre plots and these were planted to potatoes or to wheat. Some of the plots received applications of 15 tons, some 20 tons, and some 30 tons of barnyard manure that fall, which was ploughed under in early November. The plots were seeded to beets on April 26, 1929.

MANURE APPLIED AND YIELDS OF BEETS, 1929

Manure applied, per acre	*Average yield per acre
15 tons	18·55 tons
20 "	17·39 "
30 "	21·08 "
Average of manured plots	19·01 "
No manure	12·90 "
Difference in favour of manured plots	6·11 "

*P.E. 1·02.

The plots manured in the fall of 1928 and seeded to beets in 1929 were again seeded to beets in 1930 without additional manure being applied, except on the plots that receive the 15 tons application. These received another 15 tons in the fall of 1929.

Wheat plots interspersed with the beet plots in 1929 had 20 tons or 30 tons of manure ploughed under in the fall of 1929 and were seeded to beets in 1930.

MANURE APPLIED AND YIELD OF BEETS—1930

Manure applied per acre		Preceding crop	*Average yield, 1930 per acre
1928	1929		
tons	tons		tons
15	15	Beets	18 53
20	None	Beets	19 17
30	None	Beets	14 92
None	20	Wheat	15 21
None	30	Wheat	17 24
None	None	Beets	12 59
None	None	Wheat	12 62
Average of manured plots			17·01
Average of unmanured plots			12·60
Difference in favour of manured plots			4·41

*P.E. 1·21.

The average yield for all manured plots in the two years was 18·01 tons and of unmanured plots 12·75 tons, or a difference in favour of the manured plots of 5·26 tons.

The average amount of manure applied in the two years (including plots manured in 1928) was 16·25 tons or if the increase of 5·26 tons was due to manure, each ton of manure has so far produced 0·32 ton of beets. The heavier applications of manure seemed to be of no more value than the 15 tons application for the soil of this field. For this reason the returns per ton of manure applied were much higher from 15 tons than from the heavier manurings.

No account is taken here of the possible future benefits to be derived from the residual effects of the manure which the experiments show to have been very important the second year after the manure was applied.

These experiments are a part of more extensive studies of the value of barnyard manure in various crop rotations and under conditions of continuous cropping with beets. As the years go by, more useful information should be secured but at the present it is safe to say that barnyard manure has proved decidedly beneficial to the beet crop and that 15 tons of manure per acre was practically as good as heavier applications on this soil which was not in a low state of fertility.

IRRIGATION EXPERIMENTS

Experiments have been under way since 1922 for the purpose of studying the stage of plant growth when irrigation water would be of most benefit to crops. The data secured from the first six years of these experiments were compiled at the close of 1927 and published as Bulletin No. 125 N.S., "Use of Water on Farm Crops". Copies of this bulletin may be secured from the Publications Branch, Department of Agriculture, Ottawa.

IRRIGATION REQUIREMENTS IN 1928

April and May of 1928 were extremely dry, necessitating the irrigating up of many crops, a practice seldom necessary in the district except for small seed such as alfalfa and sugar beets which must be planted near the surface. Good rains were received in June and early July that furnished sufficient moisture for all crops for those months. The second cutting of alfalfa, pastures and sugar beets required irrigating about the middle of August.

IRRIGATION REQUIREMENTS IN 1929

The rainfall of April, May and June of 1929 was sufficient to provide all crops with the water needed during those months. The first crop of alfalfa hay, cut July 4, was not benefitted by irrigation, but water applied immediately after the first crop was removed was of decided value for the second crop. No increase in yields were secured from a second irrigation applied to the second crop when the plants were eighteen inches high.

Wheat given two irrigations, one in the shot blade stage on June 27 and the other in the flowering stage on July 19, gave the best yields. The highest returns from one irrigation were secured when this was applied in the shot blade stage. The grain showed some drought injury where the irrigation water was withheld until the flowering stage, with a resultant decrease in yields. Sugar beets and potatoes apparently required but one irrigation in 1929 and this seemed best for beets when applied the last week of July and for potatoes a week later.

IRRIGATION REQUIREMENTS IN 1930

The rainfall in 1930 was not nearly sufficient for the need of crops, and timely irrigation was an important factor in determining yields.

There were good rains the previous fall so the soil went into the winter well supplied with moisture, and rains the last two weeks of April and the first half of May provided sufficient moisture for almost perfect germination of seeds and to provide for the early water requirements of the crops. The effect of fall irrigation appeared to be negligible for it did not seem to influence the yields of any of the crops. June and July were moderately dry, and August extremely so, therefore all crops responded to irrigation in those months.

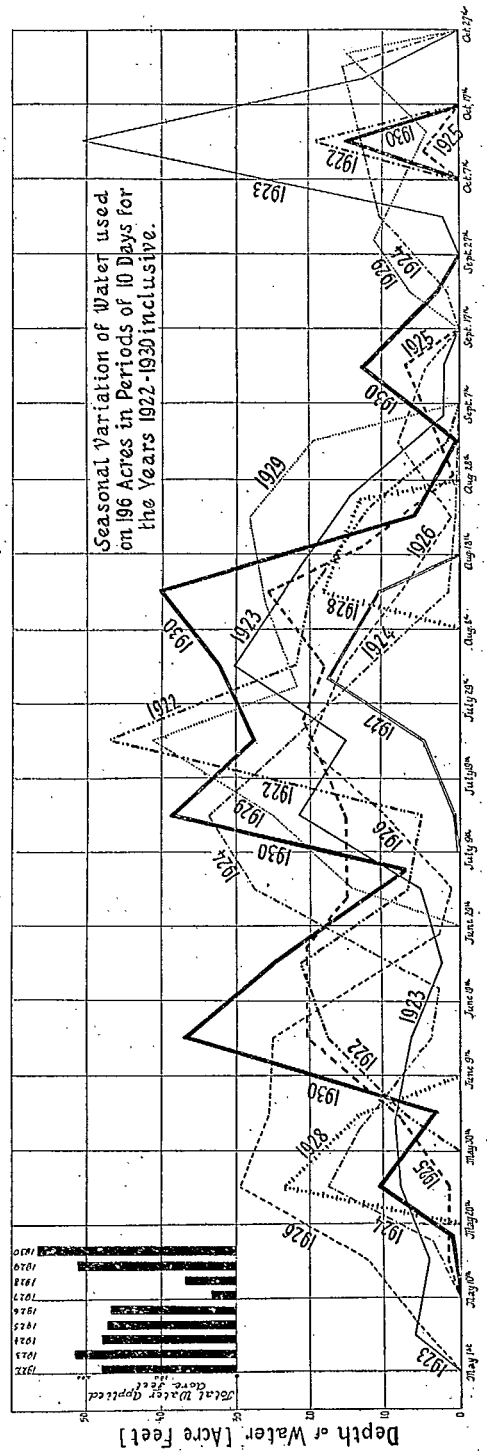
ALFALFA.—An irrigation in late May or early June when the plants were from six to twelve inches high met the requirements of the first crop, and another irrigation on July 17, immediately after the removal of the first crop, appeared ample for the second cutting. Where three crops were secured, a third irrigation was required after cutting the second crop.

WHEAT.—There was a slight advantage in yield of wheat irrigated on May 17 in the three leaf stage over that irrigated on June 12, in the five leaf stage. Where the water was withheld until June 24, when the plants were in the shot blade, drought injury was noticeable and yields were reduced from four bushels to six bushels. Plots not irrigated until July 9, when the wheat was flowering, burned badly and yielded twelve bushels per acre less than the early irrigated plots.

Two irrigations, applied in the five leaf and the flowering stages, gave from four bushels to nine bushels higher yield than was secured from one early irrigation, and plots that received three irrigations given in the five leaf, shot blade and flowering stages showed another four to nine bushels increase over two irrigations.

This year was one of the very few when wheat required three irrigations for maximum yields. These experiments have repeatedly shown that it is extremely important to apply water before the crop is injured by drought and if this is done one irrigation is usually sufficient. It might further be added that the first irrigation may be applied as early as desired, that is to say, there is no need to defer irrigation until the grain reaches any particular stage of development.

POTATOES.—There was a direct relationship between the yield of potatoes and the amount of water applied in August, three irrigations in that month having given the maximum yields. Crops did not appear to be benefitted by


Seasonal Variation of Water used on 196 Acres in Periods of 10 Days for the Years 1922-1930 inclusive.
Depth of Water [Acre Feet]
Total Water Applied Acre Feet
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
1922
1923
1924
1925
1926
1927
1928
1929
1930

water applied in July, except as the July irrigations supplied soil moisture for the use of the plants later. An irrigation applied to potatoes on September 4 did not appear to have been of any value.

SUGAR BEETS.—Two irrigations, one on July 9, five weeks after thinning, and the other on August 18, gave practically the same yields as four irrigations, and two tons of beets per acre more than one irrigation applied five weeks after thinning. Irrigating earlier than July 9 did not appear to have any advantage.

WATER USED ON THE STATION FARM

Measurements of all the irrigation water used on 196 acres of the Station farm and reported in the accompanying table and chart, showed a greater total usage for the season of 1930 than for any year in the last ten. A good carry-over of soil moisture from storms and irrigation of the previous fall, supplemented with timely rains in the last half of April and the first half of May, gave sufficient moisture for almost perfect germination of spring sown crops and to bring all crops along until the first of June.

Some irrigation water was used in May for irrigation experiments and on permanent grass pastures. On June 4 irrigation of grain commenced, and on June 10 water was turned on alfalfa, and from then until August 24 water was used almost every day. Alfalfa received two to three irrigations, grain one or two, sugar beets two, and potatoes two irrigations.

There was a moderate amount of rain in September but October was dry, so most of the alfalfa, and as much other land as possible, was fall irrigated. Water was turned out of the canals on October 15.

ACRE FEET OF WATER USED ON 196 ACRES OF LAND IN PERIODS OF 10 DAYS.—1922 TO 1930 INCLUSIVE

10-day period	1922	1923	1924	1925	1926	1927	1928	1929	1930	Average for 9 years
May 1 to May 9	.....	6·02	.....	.....	4·53	.....	.....	.....	.....	1·17
May 10 to May 19	.....	3·97	3·64	1·60	12·04	.....	.....	.....	1·25	2·50
May 20 to May 29	.....	7·82	17·50	1·50	29·54	.....	23·34	.....	10·81	10·06
May 30 to June 8	7·28	8·58	13·54	8·03	25·66	.....	13·21	.....	3·63	8·88
June 9 to June 18	17·68	6·29	3·72	20·51	24·93	.....	.....	.....	36·83	12·22
June 19 to June 28	21·41	2·08	2·60	20·64	2·30	.....	.....	.....	25·20	8·25
June 29 to July 8	6·91	5·21	27·41	14·91	1·15	.....	.....	14·44	7·17	8·58
July 9 to July 18	4·99	21·52	33·04	15·10	9·89	0·61	.....	24·88	38·75	16·53
July 19 to July 28	46·81	15·08	22·41	20·85	20·41	4·73	.....	40·08	27·63	22·00
July 29 to Aug. 7	21·94	30·23	11·65	18·32	15·42	17·60	.....	21·51	32·09	18·75
Aug. 8 to Aug. 17	19·99	23·46	1·36	25·59	7·81	10·70	18·04	25·70	39·93	19·18
Aug. 18 to Aug. 27	11·96	14·40	0·39	13·10	0·92	.....	13·15	28·18	5·69	9·75
Aug. 28 to Sept. 6	1·30	1·91	0·26	0·52	8·05	.....	.....	19·88	0·26	3·58
Sept. 7 to Sept. 16	.....	1·81	.....	7·27	4·10	.....	.....	.....	13·25	2·94
Sept. 17 to Sept. 26	.....	.....	1·22	.....	.....	.....	.....	6·75	2·99	1·22
Sept. 27 to Oct. 6	.....	2·00	10·40	.....	.....	.....	.....	10·88	.....	2·59
Oct. 7 to Oct. 16	19·25	50·34	14·07	4·68	.....	.....	.....	4·46	15·06	11·98
Oct. 17 to Oct. 27	.....	13·03	15·36	.....	.....	.....	.....	15·04	.....	4·83
Total	179·52	213·75	178·57	172·53	166·75	33·64	67·74	211·80	260·54	165·01

HORTICULTURE

THE SEASON

Trees and ornamental shrubs came through the winter of 1929-1930 well, showing practically no indications of winter-killing on even the most tender. Ornamental shrubs bloomed freely. Small fruits produced an excellent crop. Apple trees fruited very satisfactorily, but the plum crop was a failure. The

season proved favourable for all kinds of vegetables. Frequent and timely showers in the spring aided in rapid and satisfactory germination. The cool weather in the early part of the summer was favourable for the "cool season" vegetables, whilst the high temperatures during July and August favoured the growth of the "warm season" vegetables such as cucumbers, squash, tomatoes, peppers, etc., all of which did unusually well.

DRY LAND GARDEN

Although the greater part of the horticultural work is done on the irrigated part of the Station, there is on the dry land near the gardener's house a small plantation of apple trees and small fruits as well as a small vegetable garden. There is no irrigation water applied to this, and dry land methods of cultivation are tested.

The vegetable garden is planted each year on summer-fallowed land, for experience has shown that it is just as desirable to summer-fallow for garden crop as for grain crops. This point has often been mentioned in previous reports, but it is of sufficient importance to bear reiteration. The land on which a garden is to be planted on a dry land farmstead should not only have been carefully summer-fallowed the season previous but should contain a liberal amount of barnyard manure well incorporated therein. This can best be done by applying well-rotted manure just before it is ploughed for summer-fallow. Manure worked in in this way increases the ability of the soil to retain moisture, besides improving its tilth. Manure should never be applied on non-irrigated land the same season that the crop is planted. Every dry-land farmer should set aside for the kitchen garden just twice the amount of land that he intends to put in in any season. One-half should be manured as mentioned above. In May or early June it should be ploughed at least eight inches deep. During the rest of the season sufficient cultivation should be given to prevent the growth of all vegetation. The land should not be ploughed the following spring but be given sufficient surface cultivation to prepare a good seed-bed. The chances of success are greatly increased by having a shelter belt of trees planted on the windward (which is, of course, not necessarily on the north side) for besides protecting the land in a great measure from the effects of drying winds, it is almost certain to collect a bank of snow which is a great advantage. If conscientious cultivation is given it is surprising how well vegetables can be made to yield in even quite dry seasons. It is needless to point out the advantage of making the rows continuous and wide enough apart so that a horse cultivator can be used, which reduces the amount of hand-hoeing that would otherwise be necessary.

Vegetables planted in the dry land garden mature, as a rule, earlier than those on the irrigated garden. This is due mainly to the better tilth the soil is in on account of having been fallowed the previous summer.

The varieties of vegetables recommended for the dry land garden are those found most satisfactory on irrigated land, and the reader is referred in this connection to the part of this report dealing with varieties on irrigated land. The principal difference that should be observed between planting as dry land garden and one that can be irrigated is that the plants should be spaced much farther apart on the dry land so as to give the roots ample room to forage for moisture. It is recommended that such crops as onions, radishes, lettuce, etc., that are ordinarily planted 15 to 18 inches apart, should be planted in rows at least twice this distance apart. The plants should be thinned out so that they are several inches apart in the rows. If this practice is followed out and all weeds and foreign vegetation are conscientiously prevented from growing, the quantity of vegetables produced will be greatly increased, especially during dry periods.

In planting small fruits, such as currants, raspberries, strawberries, etc., the same practice as described above should be adhered to; for example it would be well to put rows of currants 7 or 8 feet apart and the plants 5 to 6 feet apart in the row, then by preventing weeds, particularly grass, from getting a start amongst the plants or between the rows the vigour of the bushes will be maintained, even in very dry years.

In addition to the growing in the dry land garden of one or more sorts of the common vegetables, a variety test of potatoes was carried out. These were planted on summer-fallowed land on May 26 and dug October 10. The following table gives the results:—

POTATOES—VARIETY TEST—DRY LAND

Yield per acre of Marketable Potatoes

Variety	1929	1930	Average yield for two years	Colour of skin	Earliness
	bush.	bush.	bush.		
Early Ohio	108	225	166·5	Light pink	Early
Gold Coin	108	221	166·5	Creamy white	Late
Wee Magregor	105	233	169·0	Creamy white	Medium
Bliss Triumph	98	220	159·0	Rose	Early
Bovee	85	243	164·0	Light pink	Early
Russet Burbank	50	205	127·5	Russet brown	Late
Netted Gem	41	170	105·5	Russet brown	Late
Irish Cobbler	41	203	122·0	Creamy white	Early

SPROUTING SEED TO PRODUCE EARLY POTATOES

A further test was carried out in the dry land garden with sprouted and unsprouted potatoes. On March 1 a quantity of Irish Cobbler potatoes was spread out in a light place free from frost. The potatoes were placed close together on the floor with the seed end up and allowed to sprout. The sprouts formed under these conditions will be green; they will also tend to be thick and short and very different to the long sprout formed in a cellar. In selecting seed for this purpose it is advisable to use small potatoes, roughly about the size of hens' eggs. These can be planted whole, there being a distinct advantage in being able to plant a whole potato early in the season as they are much less apt to rot than is the case when the sets are cut.

On April 16 the sprouted potatoes were planted along with a check lot of the same varieties unsprouted. New potatoes were ready to use from the sprouted seed by July 1, whilst it was twelve days later before potatoes were available from the unsprouted seed. On July 27 a row 100 feet long was dug from each of the two lots, and the quantity of potatoes obtained from the 100 feet row of sprouted sets was 133 pounds, and 120 pounds from the unsprouted.

IRRIGATED GARDEN

To obtain the best results from an irrigated garden careful preparation of the seed-bed is required. To obtain this the irrigated garden, wherever possible, should be ploughed in the fall and immediately harrowed down to destroy any lumps on the surface that if left would dry out and fail to pulverize down during the winter. Failure to obtain in the spring a compact seed-bed that is fine at the surface is usually caused by omitting to pulverize by a thorough harrowing in the fall as the ground is being ploughed.

Variety tests were conducted with all of the ordinary sorts of vegetables commonly grown in the district. The notes that follow indicate the varieties of some of these sorts that have proven most satisfactory during the season of 1930. A chart has been published showing the varieties of staple vegetables recommended for Southern Alberta, as determined by test for a number of years past, together with the rates and dates of planting and the approximate time when the particular vegetable is ready for use. Copies of this chart are available on application to this Station.

BEANS.—The twenty varieties tested did exceptionally well and produced a good crop. Some of the outstanding varieties were: Round Pod Kidney Wax, Masterpiece, Yellow Pod Bountiful, Stringless Green Pod.

CORN.—The season was praticularly favourable for corn. The earliest varieties of good quality were: Banting, Pickaninny, Early Adam, Sixty day Golden, Sunshine and Golden Sunshine. The best standard sort was Golden Bantam.

CUCUMBER.—The yield from all varieties of cucumbers was better than usual. Some varieties that gave the heaviest yields were: Improved Long Green, Davis Perfect and Early Fortune.

PEAS.—Peas are a crop that can always be depended on. Some good early sorts are: Thomas Laxton, American Wonder and Little Marvel. Amongst the outstanding varieties of the later sorts are: Gradus, Tall Telephone and Stratagem.

PUMPKIN.—The season is a little short for pumpkins except for the extra early sorts. A number of varieties were tested during the past season and the most satisfactory type, all things considering, including winter keeping qualities, are the small sorts, such as Small Sugar and Pie.

POTATOES.—For many years a large number of varieties have been grown at this Station and the results have been duly reported. During the past two seasons only a few of the outstanding sorts have been grown. The results are given in the following table:—

POTATOES—VARIETY TEST—IRRIGATED. YIELD PER ACRE OF MARKETABLE POTATOES

Variety	1929	1930	Average yield for two years	Colour of skin	Earliness
	bush.	bush.	bush.		
Bliss Triumph	596	653	629·5	Rose	Early
Bovee	520	650	585·0	Light pink	Early
Wee Magregor	595	583	589·0	Creamy white	Medium
Early Ohio	500	571	535·5	Light pink	Early
Irish Cobbler	555	558	556·5	Creamy white	Early
Gold Coin	610	553	581·5	Creamy white	Late
Netted Gem	448	450	449·0	Russet brown	Late
Russet Burbank	486	425	455·5	Russet brown	Late

In growing potatoes under irrigation care should be given as to when irrigation is applied. It is better not to give the first irrigation until the potatoes are in bloom. This should be a light irrigation, and further applications of water should be made often enough to keep the soil continuously moist until the potatoes are about through growing. If the season is particularly dry the first irrigation may be given earlier, the object being not to allow a check in the growth of the plant at any time during the season.

TOMATOES.—It is perhaps unnecessary to point out that only early and extra early varieties of tomatoes should be grown in this district owing to our cool summers. All the varieties that can be classed as extra early have given reasonably good satisfaction in most seasons at this Station. During the past season the yield of ripe fruit from tomatoes was particularly large.

APPLES.—Both standard and cross-bred apples came through the winter in fine shape. A fairly good crop was harvested, and all of the varieties matured before frost. The actual weight of standard apples picked for the season was 1,717 pounds. These were apples measuring over $2\frac{1}{2}$ inches in diameter and included those from both the dry land and irrigated orchards. The cross-bred apples, as usual, gave excellent yields and the total weight of small apples harvested was 3,230 pounds. During the past season a few good apple seedlings bore fruit for the first time.

PLUMS.—There were practically no blooms on any of the plum trees.

CURRANTS AND RASPBERRIES.—Both currants and raspberries gave very satisfactory yields of fruit during the past season.

SHRUBS

The flowering shrubs bloomed freely again and added greatly to the attraction of the grounds. Some of the outstanding kinds are: lilacs, honeysuckles, caraganas, spiræa and *Prunus maacki*, or May-day tree. The last named variety appears to be absolutely hardy and is very early in flowering, which makes it attractive when no other trees and shrubs are in bloom.

LAWNS

The lawns were in good condition throughout the summer. During the winter of 1929 an application of well-rotted manure was applied to them. The manure was well broken up and raked in during the winter and early spring at periods when the manure was not too dry. By this practice it was possible to have all the manure remain on the lawns as none of it had to be raked off when they were cut in the spring.

POULTRY

Only one breed, the Barred Plymouth Rock, is used in the poultry work at this Station and a strain has been developed that has proven to be prolific and well suited to Alberta conditions.

FEEDING

A standard scratch grain was used, consisting of 400 pounds of wheat and 100 pounds each of oats and crushed barley or cracked corn. This was fed twice daily, a small portion in the morning and the balance about one hour before the birds went to roost. A dry mash made up of 100 pounds each of low grade flour, shorts and bran (for which 300 pounds ground wheat could be substituted), 100 pounds oat chop, 100 pounds ground barley or yellow corn meal (150 pounds in winter), 75 pounds of 50 per cent protein 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 small amount of a moist, crumbly mash, consisting of 150 pounds of ground barley or yellow corn meal, 150 pounds oat chop, 100 pounds shorts, 100 pounds bran and 10 pounds crude cod liver oil, was fed daily at noon, the amount given being what they would eat in about ten minutes. For succulent feeds, cabbage, mangles, beets, sugar

beets and alfalfa leaves were used. These were augmented in the spring and summer by the growth of alfalfa in the runs, or green alfalfa cut daily.

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.

EXPERIMENTS

FEEDING.—All the experimental feeding had to be abandoned in February owing to an epidemic of infectious bronchitis or flu, which made it impossible to secure comparable results.

RAISING CHICKS ON OPEN RANGE VS. CONFINEMENT.—An experiment was started this year to compare birds raised in confinement with birds raised on clean range. On May 9 sufficient chicks were hatched to give seventy selected pullets. At eight weeks of age these birds were divided into two lots of thirty-five birds each, one lot remaining in the brooder house, the other going on range with the balance of the growing stock of the Station. The range used had never had poultry on it before, was ample in area, supplied sufficient green food for the birds and was almost ideal in every day. The regular practices of sanitation were followed, that is, all the houses were cleaned as they needed it. The house in which the confined birds were kept had to be cleaned about as often again as the houses on range. Both lots were given the regular growing mash and scratch grain, the mash fed in open hoppers, and grain fed once a day and the birds raised in confinement were given fresh cut green alfalfa every morning. No comparative cost of production can be given as the birds on range were with another lot of seventy-five pullets, older than themselves.

The birds in confinement were provided with a wire-bottom porch, four feet wide and eight feet long, placed on the south side of the house. This porch was screened on bottom, sides and top with one-half inch wire netting.

The following is a comparison of these two lots to December 31, 1930:—

	Confined	Range
Number of birds at start	35	35
Average weight at 8 weeks	1·3	1·3
Average weight October 22	4·6	4·1
Date first egg	October 20	November 6
Number birds laying, December 31	24	24
Average number eggs to December 31	29	22
Average egg weight to December 31 ounces	21·7	21·7
Mortality to December 31	1	3

All during the growing season the chicks kept in confinement were to all appearances about two weeks in advance of those on range, and after they were placed in the laying house, it was easy to distinguish the two lots.

Of the seventy birds to start on the experiment, fifty were placed in a house together and are being trap nested. Records will be kept of the future performance of these birds as egg producers and as breeders, as the primary purpose of the experiment is to test the feasibility of raising breeding stock in confinement.

ALBERTA EGG LAYING CONTEST

The Eleventh Alberta Egg Laying Contest started November 1, 1929 and continued for fifty-one weeks. An epidemic of infectious bronchitis spread through the entire contest during the first month, resulting in a number of deaths and greatly retarding production until after the first of January.

Twenty-four pens, of ten birds each, completed the fifty-one weeks of the contest year, and, notwithstanding the early setback, laid an average of 174·7 eggs per bird.

Sixty-two birds qualified for registration in the Canadian National Live Stock records by laying 200 eggs or more, averaging at least twenty-four ounces per dozen in weight after the first four weeks.

FINAL STANDING OF TEN LEADING PENS AND BIRDS

*Leading Pens**

Breed	Owner	Eggs	Points
1. S.C. White Leghorn	Syd. Caldwell, Stettler, Alta.	2,166	2,403·2
2. S.C. White Leghorn	Glen Brown, Big Valley, Alta.	2,222	2,258·7
3. S.C. Rhode Island Red	Fred. Garrick, Coalhurst, Alta.	2,031	2,209·4
4. Barred Plymouth Rock	E. Brewitt, Michichi, Alta.	2,012	2,164·5
5. S.C. White Leghorn	T. A. Brazil, Nakamun, Alta.	1,961	2,121·5
6. S.C. Rhode Island Red	Mrs. J. W. Cooper, Ranier, Alta.	1,817	2,056·5
7. Barred Plymouth Rock	Frank Gould, Big Valley, Alta.	1,851	2,043·7
8. S.C. White Leghorn	Oaks Poultry Farm, Cloverdale, B.C.	1,953	2,013·0
9. Barred Plymouth Rock	C. M. Nicol, Kipp, Alta.	2,135	2,009·5
10. S.C. White Leghorn	Dom. Exp. Station, Windermere, B.C.	1,897	2,000·2

*Leading Birds**

Breed	Owner	Eggs	Points
1. S.C. White Leghorn	Syd. Caldwell, Stettler, Alta.	268	308·9
2. S.C. White Leghorn	Calgary Poultry Farm, Calgary, Alta.	251	284·1
3. S.C. White Leghorn	Dowd & Moran	252	282·4
4. S.C. White Leghorn	B. F. Galbraith, Sangudo, Alta.	243	276·2
5. Barred Plymouth Rock	E. Brewitt, Michichi, Alta.	271	274·0
6. S.C. White Leghorn	C. W. Lawson	232	271·4
7. S.C. White Leghorn	Syd. Caldwell, Stettler, Alta.	258	271·3
8. S.C. White Leghorn	Syd. Caldwell, Stettler, Alta.	230	270·2
9. White Wyandotte	W. W. Freeman, Edmonton, Alta.	231	269·5
10. Barred Plymouth Rock	Experimental Station, Lethbridge, Alta.	235	269·0

* Arranged in order of total points: an egg averaging 24 ounces per dozen was credited as one point. One-tenth point was added for each ounce over 24 ounces, and one-tenth point was deducted for each ounce under 24 ounces. Eggs weighing over 26 ounces per dozen were credited as 26 ounces, and eggs under 20 ounces were not counted.

HENS REGISTERED IN 1930

Breeder	Breed	Number of birds registered	Average eggs	Average points
Syd. Caldwell, Stettler, Alta.	S.C.W.L.	6	240	268·1
Glen Brown, Big Valley, Alta.	S.C.W.L.	6	245	254·6
T. A. Brazil, Nakamun, Alta.	S.C.W.L.	5	221	235·5
Oaks Poultry Farm, Cloverdale, B.C.	S.C.W.L.	5	215	219·1
Fred. Garrick, Coalhurst, Alta.	S.C.R.I.R.	4	225	252·4
Ed. Brewitt, Michichi, Alta.	B.P.R.	4	235	246·4
Frank Gould, Big Valley, Alta.	B.P.R.	4	219	245·1
C. M. Nicol, Kipp, Alta.	B.P.R.	4	223	230·7
Mrs. J. W. Cooper, Rainier, Alta.	S.C.R.I.R.	3	222	249·5
Clover Lea Stock Farm, Edmonton, Alta.	S.C.W.L.	3	220	249·2
Dowd & Moran, New Westminster, B.C.	S.C.W.L.	2	238	261·3
C. W. Drayton, Picardville, Alta.	B.P.R.	2	233	245·8
Calgary Poultry Farm, Calgary, Alta.	S.C.W.L.	2	230	244·2
Mrs. W. J. Bell, Braintree, Alta.	S.C.W.L.	2	210	229·2
H. A. Malcolm, Innisfail, Alta.	S.C.W.L.	2	202	224·6
B. F. Galbraith, Sangudo, Alta.	S.C.W.L.	1	243	277·2
C. W. Lawson, Port Kells, B.C.	S.C.W.L.	1	232	271·4
Experimental Station, Lethbridge	B.P.R.	1	235	269·0
Hein Poultry Farm, Forest Lawn, Alta.	B.P.R.	1	248	260·7
Experimental Station, Windermere, B.C.	S.C.W.L.	1	208	237·5
E. E. Stafford, Sheerness, Alta.	B.O.	1	207	237·4
Smith, Bros., Surrey Centre, B.C.	S.C.W.L.	1	206	218·4
W. W. Freeman, Edmonton, Alta.	W.W.	1	208	207·2

BEES

The expansion of commercial honey production and the increase in numbers of beekeepers who are keping a few colonies of bees in Alberta has been very marked during the last five years. The industry has now reached the exporting stage, when Alberta honey must be properly graded in order to compete successfully with other honeys on foreign markets.

WINTER OF 1929-30

The colonies at the Station apiary were packed and fed by October 20 and went into the winter in good condition. The fall was ideal, with the weather cold enough to keep the bees quiet. The first continued snow storm period began on December 8, lasted ten days and by December 16 there were eighteen inches of snow on the ground. This snow had all disappeared, except in shaded places, by the New Year. The storms during December were conspicuous for the lack of wind with the snow, which is unusual here. The winter was early, steady, and stormy, with no extremely cold temperatures.

There was no bee flight from December 1 until February 16 and 17, when, during thawing weather, accompanied by strong Chinook winds, many bees were lost while endeavouring to take a cleansing flight. Of five colonies examined in the Station bee yard at this time four were found to have two frames of eggs and larvæ in each brood chamber, and abundant stores.

Of the 107 colonies placed in wintering quarters, 93 were alive on April 20. Some that were weak or queenless were later united during the shortage of nectar which occurred as usual in the first and second weeks of June or just after the dandelions finished and before the clovers began secreting nectar.

THE SEASON AND HONEY FLOW OF 1930

Spring weather conditions for the bees were cold and changeable, with frosty air and threatening snow flurries. This continued well into the month of May so that colonies built up slowly. Pussy willows were showing pollen on the third of March and bees were gathering pollen from cottonwood, willows and a few early dandelions by April 28, when prairie flowers were also in full bloom. On May 7 all colonies were given a five-pound pail of warm sugar syrup to offset the effect of the changeable weather and to induce the queen to lay more to enlarge the bee population for the harvest.

Ample pollen was available at all times from March until the fall freeze-up. Colonies became strong on a maintenance yield of nectar from dandelions, lilac, and caragana bloom in May, then a shortage of bloom retarded increase until the main flow began from White Dutch and yellow bloosom sweet clovers on June 22 when a gain of two pounds was shown by a colony on scales. From that date the flow of nectar, while not showing any outstanding daily gains in weight, was unusually steady until August 19.

The quantity of extracted honey produced by the strongest colony was 526 pounds for the season, and the greatest gain for one colony on scales for one day was 24 pounds.

PREPARING COLONIES FOR WINTERING

In 1928 and 1929 reports from this Station describe methods of packing colonies for wintering and the results obtained. For the past four years a different method to those reported has been tried which appears to be more economical and is giving satisfactory returns. Local beekeepers are now using

it and speak favourably of the conditions in which colonies are brought through the winter with its use. The method consists of leaving the colony on its original summer base, making sure that the base fits snugly on the ground, and that no crevices are left for the wind to blow under the hive. This can be accomplished by filling the base form with soil up to within an inch of colony's bottom board. The colonies are examined to see that they are queenright and if Jumbo colonies are used they are fed sugar syrup to weigh 90 pounds each with hive cover on. Ten-frame Langstroth are fed to weigh 80 pounds. Each colony is then wrapped, first with preferably a layer of ordinary white untarred building paper, the entire hive being wrapped, including the cover and the four sides, down to the ground. After this inner layer of paper is smoothly folded down a second or outer layer of tar paper is put on, and both layers are fastened by tacking pieces of lath around the hive stand close to the ground. The bee entrance is reduced to four inches by three-eights of an inch and left open.

Data recorded in the following table show that this way of packing, apart from its cheapness and convenience, compares favourably with other methods reported, for bringing colonies strongly through the winter. Only four-year averages are given in the table but the results of each year were relatively the same.

COMPARISON OF METHODS OF PACKING BEES FOR WINTER

Method of packing for winter protection	Averages of four years' results			
	Total colonies packed in fall	Total colonies vacant in spring	Per cent lost	Average food consumed per colony
			p.c.	lb.
Wrapped with paper	49	4	8·2	32
Packed in cases with planer shavings—				
4 colonies in a case	60	5	8·3	31
2 colonies in a case	52	14	27·0	35
1 colony in a case	24	9	37·5	38

DIFFERENT SIZES OF BROOD CHAMBERS FOR WINTERING BEES

A five-years test was completed this year comparing the merits of different sizes of brood chambers for bringing bees through the winter. Jumbo and Langstroth hives were compared and Langstroths enlarged by adding a shallow super and a full depth super was also used.

The five years' results showed no significant difference in the amount of honey produced where the various sized brood chambers were used for wintering but the winter loss of colonies was greatest in the Langstroth hives with a full depth super, and next in the Langstroth without a super. The Langstroth with a shallow super added and the Jumbo gave about the same results and appeared to furnish about the room required for wintering a strong colony.

WINTERING SMALL COLONIES

Good results have been experienced in wintering small colonies by bringing two of them together in one hive with a bee-tight division board separating the two colonies. The openings were placed on opposite ends of the hive to overcome the difficulty of having the openings too close together.

A total of sixty-four small colonies have been wintered in this manner during the seven years that the method has been tried; the colonies having been

packed with shavings in single colony packing cases. Of these only nine colonies, or 14 per cent have failed to survive the winter. These small colonies have been very useful for strengthening weak colonies in the spring and where their queens were young and vigorous they have been used for requeening purposes.

If the bees were not required for strengthening other colonies each division was given a full sized brood chamber and permitted to build up to full strength, which they usualy did in time to produce a profitable crop of honey.

Removing one of the queens and uniting the two colonies that had been wintered in the one hive did not prove as desirable as making two colonies.

STRENGTHENING WEAK COLONIES IN THE SPRING

Three methods of strengthening weak colonies in the spring have been compared over a period of seven years. These were: (1) adding a one-pound package of imported bees, (2) giving one frame of emerging brood with clinging bees brushed off, (3) placing the weak colony, above a queen excluder, over a strong colony where it is left for six weeks when the bottom colony is moved to a new location.

The data secured indicate that either method is satisfactory; the one to be recommended depending on the situation of the beekeeper and his colonies.

DETECTING SWARM PREPARATION

Following closely the early pollen and nectar flows comes a period of crowding or congestion in the rapidly strengthening brood chambers of colonies, if they are not very carefully observed. Queen cells for swarming or for supersedeing failing queens are the result of this crowded condition and in order to carefully and quickly find and watch these preparations for producing queens, the following method has been tried out and proven very satisfactory. As soon as colonies showed signs of congestion of the brood chambers in the spring, a shallow super was added to each regular brood chamber allowing the queen to use the two as a double-brood chamber. At the regular examination every nine or ten days the shallow super was tipped from the back and any queen cells present along the lower edges of the shallow combs, with eggs or larvæ in, were treated as swarm cells. Any queen cells found on combs in the lower super were thought to be supersedure cells and were treated as such. Through five years' duration of the test one hundred colonies were used of which number, forty eight did not make any swarm preparations, six colonies produced eggs only in the queen cells and thirty-three were found to have cells containing larvæ, or, thirty-nine colonies, by using the simple method of tipping the shallow supers, were found to be making swarm preparations and were treated by approved methods for swarm control. Of the sixty-two colonies in all, that showed queen cells, there were thirteen produced cells in the lower brood chamber only. These being considered supersedure cells, were allowed as such to develop and emerge queens to requeen the parent colony. Eleven of these colonies produced new queens after destroying their old ones, and two colonies swarmed out.

The data gathered give satisfactory proof that colonies, producing queen cells on the combs in the lower chamber, should have their queens carefully observed for symptoms of failing and such colonies should be requeened. Also it would appear that a great deal of labour and time, otherwise used in going through brood chambers examining each comb for queen cells, could be avoided by adopting the "tip the super system."

CONTROL OF SWARMING

It is an established fact amongst beekeepers that excessive swarming reduces what would otherwise be a satisfactory honey crop. Six years' results are now available dealing with three methods of controlling swarms as outlined in the 1929 Annual Report of this Station. They are:

A By dequeening and requeening.
B By separation of queen and brood.
C Periodical destruction of queen cells.

The year of 1930, having a season of longer and stronger nectar secretions, provided a better test on the efficiency of the methods used. The order of the value of the data found during the other five seasons of the test were not changed with the more severe tests made by the 1930 honey flow. In all three groups there was an average increase in extracted honey produced, caused by the better season. Test A gave an average colony production for the six years of 84·33 pounds of extracted honey with $6\frac{2}{3}$ per cent of its colonies giving off swarms.

Test B gave the most satisfactory production although $13\frac{1}{3}$ per cent of the colonies in it swarmed. The colony production of honey was 97·5 pounds.

Test C is a laborious and not very efficient method and gives considerable trouble. It may have a retarding influence for a time on colonies where cells are destroyed, but that only gives time for more bees to emerge, become workers, and go out with the prime swarm to the greater depletion of the already loafing colony. Six years' duration of this method for control of swarms gave $43\frac{1}{3}$ per cent of the colonies putting out swarms and an average colony production of 75 pounds of extracted honey.

METHODS AND TIMES TO MAKE INCREASE

Three methods of making increase have been tested out in the Station bee yard. They are:—

1. As early in the spring as colonies chosen were strong enough to show indication of congestion in the brood nest, all capped brood and adhering bees were removed and placed in an empty hive on a new stand where a young laying queen was introduced. The old queen was left in the old hive on the old stand.

2. In the early summer each colony was given a shallow super of drawn combs without a queen excluder. At the beginning of the main nectar flow the old queen with two combs of emerging brood and adhering bees were placed in a new hive in a new location. If queen cells were present in the old colony at the time the queen was removed they were destroyed and the colony left queenless for ten days. On the tenth day the queen cells were again destroyed and a young laying queen was introduced. If there were no queen cells in the colony when the queen was removed a young laying queen was introduced twelve hours after the old one was taken out.

3. Equally strong colonies were each given a deep super of drawn combs as soon as the colony became strong enough in the spring or early summer. Just after the main flow started as much capped brood as possible was placed in the lower chamber and the old queen was shaken on to these combs. All uncapped brood and adhering bees were placed in a new hive and new stand and a young laying queen was given this new increase.

Queens, seasons, and honey flows vary, but during seven seasons' results of the experiment it appeared that colonies could be increased and swarming retarded by either of the three methods tested. The first or second named method

is preferred in that the manipulation to produce the increase was made before the swarming instinct was established and also the increase had a longer period to grow into a strong colony for the winter following.

The third method while satisfactory for increase is carried out at a time when the full honey flow is on, a busy season for the bees and beekeeper; when every available worker bee should be in the fields, and the taking apart of the brood chambers seems to cause a few days of loafing or readjusting of the changed conditions in the colony.

INCREASING STRENGTH OF COLONY FOR THE MAIN HONEY FLOW

As soon as the weather became warm and a colony became strong enough to need a honey super or a second brood chamber, three or four combs of capped brood with adhering bees were removed from the hive and placed in another hive body, the place made vacant by the removal of the combs was filled with drawn combs. The old queen was left in the original hive and a deep honey super was placed above the hive. On top of the honey super was fixed an ordinary colony bottom board with the opening on the under side closed so that the bees could not fly out from the top of the lower hive. The hive body containing the combs of capped brood was filled out with drawn combs and placed on this upper hive platform and a young laying queen was introduced. Each hive, two on the one base, had its own entrance. When the honey flow was on the queen was taken away from the lower hive, the upper platform was removed and replaced by a sheet of newspaper and the two forces of bees from the two queens mingled and united for the honey flow. Care was taken at the time of reuniting the colonies to see that the bees were flying freely and that a strong nectar secretion was in progress so that the worker bees being busy out in the fields did not fight and make trouble.

It would appear that manipulation at the time when colonies were rapidly strengthening gave more room and did control swarming which was developing at that period in colonies with one queen. The average yearly production per colony for five years where two queens were used in one colony was 104·7 pounds, and check colonies with one queen stored 95·7 pounds of extracted honey. The average colony production over the same period for colonies in other projects run with one queen was 88·7 pounds.

DAILY HONEY PRODUCTION

In the spring of 1921 a colony of bees was placed on scales and weighed daily during the honey season to secure data on the time nectar secretion commenced in the spring and stopped in the fall and the fluctuations that occurred during the season. This practice was continued the following year. In 1923 a second colony was placed on scales and each year since, daily weighings of the two colonies have been made so that data of the daily weights of one colony for two years and two colonies for eight years are now available.

A comparison of the honey production for the various years shows that for the first three years of the period—1921, 1922 and 1923—there was a fairly steady flow of nectar during July and August, but that in the following seven years, while the July flow continued to be quite regular each year, the August flow was variable, and in some seasons very small. This decrease in the August flow was coincident with a decided reduction in the acreage of alfalfa in the vicinity of the Station. During the same period there was an increase in the acreage of sweet clover and it is now quite evident that sweet clover has provided a good nectar flow in July and that the bees have depended principally on alfalfa for their August production.

Another interesting study has been a comparison of the daily honey production with the weather data. It indicates that continued excessive heat is not conducive to high nectar yields. The ideal condition here appears to be a day temperature of about 80° F. and not above 90° F. following a warm day with showers and a night temperature of about 54° F. On irrigated land a few days of dry warm weather following an irrigation usually gives a heavy nectar flow from the field.

Winds, cold rain and cool weather always cause a reduction, or a total cessation in the storage of honey.

A summary of the data secured shows that the bees were able to store nectar for an average of 59·2 days of each year. There were an average of 8·7 days during the honey season when the colonies actually lost weight, due to cold, wind or rain, and 10·7 days during which they neither lost nor gained in weight.

The greatest season's production for one colony was 526 pounds, and the greatest gain in weight for a colony for one day was 24 pounds. Both of these records were made in 1930.

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